RIG

Remote **I**maging **G**roup
JOURNAL

REMOTE IMAGING GROUP JOURNAL No. 38

CONTENTS SEPTEMBER 1994

Centre pages: Predictions courtesy Simon Goodall

REMOTE IMAGING GROUP

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RIG PACKET	G3CQL @ GB7SFK - "RIG WXSAT BULLETIN"
Published by Printed by	The Remote Imaging Group (RIG). VAT Registration No. 594 7483 83 St. George's Press (Windsor) Ltd

CHAIRMAN'S WAFFLE
HENRY NEALE

Well - here I sit - not knowing which job to do first! The EBB keeps crashing, there is a moderate pile of mail to attend to, the office is knee deep, the phone keeps ringing and the Chairman's Waffle requires writing. At least the hard part of the rally season is now over and I can have a few weekends catching up.

I also have a confession to make - the motor didn't make the 200,000. It had a misadventure at 197764 and is now at one of those graveyards in Shropshire I'm told. It resulted in Henry smashing the front passenger window with his head and not knowing much at all! I was involved in a side-collision and the acceleration in that direction left me with my body laid on the front passenger seat and my head laying on the window sill. The next I can recall is in hospital 2 hours later. I never liked injections and muttered something like "I don't need one of them" (tetanus injection) and before I could do anything it was too late and someone said "he won't need another one for 10 years"! Much to my disgust I was kept in over-night and was kept awake by having my heart rate and blood preasure taken regularily - just as I had dropped off to sleep. When morning came (the accident happened just before 7pm in the evening) I soon became conscious of the fact that my vision was not functioning correctly - must run "SETMODE". I had a cut with 6 stitches on my left forehead but my left eye was not 100%. The upper elevations were OK but as I lowered the line of sight to the 50% level my left eye started doing its own thing and when I reached the lower levels (my feet) It had rotated as well! I soon got fed up with just being there and eventually discharged myself in the late after-noon. If meaningful tests were being carried out I would have been pleaseed to stay but heart rate and blood preasure just meant that I was still alive and the work would not get done on its own!

This has resulted in some of you having to wait a little longer for your orders but I am just about up to date now. Some new products have been added to our reper-toire. We now stock 5-element crossed-Yagis. Manufactured by Jaybeam they are of good quality and we purchased them at a low price so that we can sell them to members for £55. Crossed-dipoles respond down to the horizon but have very little gain at that elevation. If these crossed-Yagis are mounted on a rotator and given a 20 degree elevation they will cover all the lower passes. When the signal comes from a higher elevation you just switch to the crossed dipoles. To stop them from giving unusual responses it would be wise to mount them from the rear so that the pole does not go through the beam. They are about +/- 20 degree beamwidth so why waste it below the horizon? - Elevate it.

On a rally stand I saw a box full of audio transformers. They looked exactly the type to have in your audio leads to reduce PC interference being radiated back to the receiver/aerial from the audio lead itself. They are medium-impedance windings and have a 1:1 ratio. The secondary is centre tapped if required and are suitable for the job. They need to be fitted in the audio lead as near to the PC as possible. They should be treated like a mains isolating transformer and the screened parts should NOT be connected together. This allows the two windings to be coupled to the core magnetically but not electrically. This will reduce stray radiation but will not cure a bad case!

My telephone number will be changing in mid-October to 01945 440353 and the EBB will become 01945 440666. That includes the additional 1 that is being added to all UK area codes.

We have had a bit of a re-organisation so that Mail Order is to go direct to Peter Wakelin. This will relieve me of a fair amount of work. Orders via plastic still go to Mark Clarke. This should result in a speed-up of your orders but please leave a moderate period before you check that we have received your order etc. If you have any problems of any sort then contact myself so that I can try and sort it out for you.

The Rally season is not finished but the hectic part is over. I should apologise to those of you that found a less than attentive Chairman behind the table and hope that the explanation given above covers it all. I have had many derogatory remarks from my friends like "you are all right apart from mentally" and a local one of my "dissapointing several people - by surviving"! I need friends like that - if only to stand on! I am recouperating slowly but the farmwork in summer keeps coming and there is only Henry to do it so I have to get on with it. The second combine is now redundant cos I now have a "X" reg one with an airconditioned cab. How long before its got GPS or other sophisticated devices attached? Perhaps I can use the refrigerated drinks as a fire extinguisher after they have been processed! The cab is so high up that I might even get unencrypted PDUS! It definitely requires a data link and mobile phone to make certain that my meals are on time. If the PC could stand the vibration I might get a animation system runing - so that I know when to expect it to have a breakdown!

Best wishes, Henry

IMPORTANT CHANGES

Owing to the cessation of supplies of Timestep products to RIG, we are unable to sell their goods to members. Products of other manufacturers sold through RIG are unaffected. RIG will continue to seek advantageous prices for members wherever possible.

In view of the above, and because of the logistical problems, etc., the committee has decided that we will no longer sell equipment at rallies. We will, of course, be willing to take orders for RIG-supplied items at rallies for despatch by mail. This will enable us to improve our remote imaging demonstrations and free more time for interaction with members. ⊛

NEWS ON ENCRYPTION

Meteosat imagery is of two types: High Resolution Imagery (HRI) data, received by Primary Data User Stations (PDUS) and lower resolution analogue WEFAX imagery received by Secondary Data User Stations (SDUS). Access to HRI data is to be controlled through an encryption and decryption system. Image encryption will be implemented gradually in April, June and September 1995. From 1 September 1995, all HRI data will be encrypted, except images at 6-hourly intervals. Every user of HRI data needing more than the 6-hourly images will need a decryption capability. The WEFAX image broadcast service will remain unencrypted.

License fees, where appropriate, are the responsibility of the Met Office for users in the UK and final arrangements are not yet known. However, in the case of educational and amateur users it is known that they do not propose to licence INDIVIDUAL users. There is to be some form of registration, which will probably be extended to SDUS users as well.

In July, EUMETSAT sent a letter to most members, together with a User Registration Form. Any RIG members who receive HRI (or are planning to soon) and want to receive more than the un-encrypted 6-hourly data should complete and return the form. UK members in this category who have NOT received the registration form can send a large, stamped addressed envelope to the Editor for a copy. Overseas members should contact EUMETSAT, Meteosat Operational Programme Manager, Am Elfengrund 45, D-64242 Darmstadt-Eberstadt, Germany. If you are not registered with EUMETSAT you will not be able to access encrypted data. Those who are content with the four-minute WEFAX imagery from SDUS need take no action. ⊛

FROM THE EDITOR'S DESK

PETER WAKELIN

At a committee meeting late last year it was agreed that RIG should not confine its activities to weather satellites. Remote imaging means imaging from a site other than that of the observer so, although we have no plans to demonstrate how to tape a video camera to a pigeon, we will be looking at imaging and images from platforms other than weather satellites. Recent events make this seem a good time to start.

Perhaps someone at that meeting had a premonition that comet Shoemaker-Levy 9, which condensed out of the primordial gases over 4,000 million years ago was about to revert to vapour in a very spectacular fashion. Requests to our GIF image library indicate a considerable interest in astromomical imaging among our members and as comet/planet collisions are extremely rare I have devoted three of the colour pages to this event.

These images came from the USA over the Internet, or the "Information Superhighway" and I was viewing them within hours of the events thanks to the United States Government's "Open Skies" freedom of information policy. A few days later I down-loaded, via the USA, a high resolution image from the Japanese GMS-4 satellite stationed over 140 degrees E. and a similar one from GOES-7 above 135W. At the same time Meteosat primary data images were coming in on my second computer. All the information was less than three hours old and, apart from the equipment costs, it was virtually free. Regrettably, this situation is about to change.

Soon, I shall be denied free access to one of these sources of data. It will not be the American satellite, or the Japanese one, but our own European Meteosat. By this time next year most Meteosat high resolution images will be encrypted. Due largely to representations made to numerous authorities by RIG's Frank Bell, it seems that, in the UK at least, license fees for educational and amateur decryption facilities will be small but there will still be hardware costs.

The next generation of polar-orbiting weather satellites is being developed in the USA and EUMETSAT is working on METOP1 for a launch six years from now. Discussions are underway between NOAA and EUMETSAT which may lead to METOP1 forming part of the proposed 3-satellite constellation. With such widely differing views on the accessibility of data, could an integrated system possibly work? Would METOP1 data be encrypted when the satellite is within range of a EUMETSAT member state?

If you live on the north side of a tall apartment block you may well experience difficulty in receiving satellite images. One weather satellite image received via Internet appears in this issue and, in some situations, this could possibily be a viable alternative to direct reception. Meteosat's D2 images are available on-line almost immediately after transmission, as are NOAA 11 images of the UK. However, the recent dramatic increase in demand for Internet facilities has put a tremendous strain on the system and some drastic measures will need to be taken if it is not to grind to a halt. Let's hope that purely monetary policies do not prevail and data via Internet will still be freely available when the next comet/planet collision occurs. ⊛

SUBMISSION OF ITEMS FOR PUBLICATION AND COPY DEADLINES

Please send contributions to the Editor. Although typed and hand-written items will be considered we would prefer longer pieces to be on a PC disk in one of the popular word-processing formats, ideally in WordPerfect. Drawings and diagrams may be submitted on disk, preferably in a Windows Meta File compatible format, but please send hard copy also. To reproduce well, satellite images must have a good range of tones. Contact the Editor for further information.

COPY DEADLINE FOR THE DECEMBER ISSUE: 25 OCTOBER 1994

Advertisers' copy is required by 18 OCTOBER 1994 and should be sent direct to Michael Gill (address on page 2). ⊛

MAKE YOUR OWN MULTISPECTRAL SATELLITE IMAGES
Les Hamilton

Like myself, some readers will have marvelled at the multispectral images produced by Cedric Roberts (RIG 33) and Trevor Smithers (RIG 35) and which are available on disks 121 and 126 from the GIF Image Library. Unfortunately, the software needed to work this miracle has, until now, been priced well beyond the reach of most of us. The advent of Belmont Image Technician could bring the creation of composite images within reach. Thanks to the Edinburgh firm Belmont Imaging, a shareware version of their program is being made available specifically to RIG members. Following the usual 30-day trial period, they offer registration at a reduced license fee.

Program Features

Belmont Image Technician is a Windows-based program for manipulating images in TIF, TGA, BMP, GIF, DIB, PCX and JPG formats, mostly with colour depths of up to 24 bits. Since many of the operations featured by the program are computationally intensive, a 386 DX33 is recommended as the minimum computer specification, as are 8 megabytes of memory and an SVGA graphics card capable of at least 800*600*256 colours. Belmont Image Technician also includes specialist routines for the amateur astronomer, including computer control of the Meade LX200 and compatible telescopes, and the ability to merge together three greyscale CCD images taken separately through red, green and blue filters. It is this last feature that can be turned equally well to the combination of images from NOAA and Meteosat weather satellites. It should be noted that the merge facility operates only on 8-bit images.

Although Belmont Image Technician is a typical menu-driven Windows application, the majority of its features are also conveniently accessed by clicking icons on two icon-bars, one at the top of the screen and the other at the foot. As a result, the program is extremely user-friendly, almost to the extent of being completely intuitive to use. Among the features accessible in this way are loading, saving, merging and printing image files, brightness/contrast controls, histogram and matrix operations, sharpening, softening, edge extraction, greyscaling, converting to negative, colour replacement and image rotation. Mirroring an image is also possible from the 'Effects' Menu. It is simplicity itself to set up your own 3-by-3 or 5-by-5 filters, which can be saved and reloaded for future use. In short, almost everything you could wish for to enhance and manipulate images is available via one of the most user-friendly interfaces seen in a long while.

Preparing NOAA Images from PROsat II for Tri-colour Merging

The visible and infra-red NOAA images captured by PROsat II provide ideal material for tri-colour merging although, at first sight, the presence of just two images might appear to be a problem. This, however, is easily solved, as will be seen shortly. I use a PC with 8 Mb of RAM, which successfully merges 640*480 and 800*600 images, but runs out of memory when tried with the full 1024*768 output of PROsat II. If you are in doubt, start with 640*480 images, specially if you have less than 8 Mb RAM.

Here's how to obtain the green and blue images. With a twin NOAA image in PROsat II, select the area to be used from the Display Menu and display the visible image. Next, apply a histogram equalisation to the image by pressing C followed by E. Sometimes visible images of good contrast show little or no apparent change after this process. Then save the screen image in .BMP format using Alt-B. Now switch to the IR image of the same area and repeat the above process. For convenience, rename the two files created as GREEN.BMP and BLUE.BMP or something similar. Note that early versions of PROsat II cannot save directly in BMP format so save in PCX and convert to BMP with VPIC or a similar program. The reason for using the BMP file format is that it is Microsoft Windows' native bitmapped image type and, as such, loads and saves far quicker that other formats, particularly those involving compression like PCX and GIF.

If we combine just a blue and a green image, the resulting composite will show a severe colour imbalance, particularly as there is no red component to create the shades of white and grey that will portray the cloud cover. This problem was discussed in a previous article by C. G. Roberts (RIG 33, page 55). Since the brightest areas from both the blue and green images represent white, it is necessary to create a 'red' image that shows high intensity principally in these regions. This can be achieved readily using the excellent shareware program PHOTOLAB (available on Shareware Disk I-02 - registration $30). The procedure is as follows. Run PHOTOLAB and load the blue image, BLUE.BMP. Next, select 'Convert to' from the 'Image' Menu. Click on the '256 grey' check box, then on 'OK' to produce a greyscale image and save this back to disk. Load the green image, and repeat the process.

You can now combine the two images. With the green image still loaded, again select 'Convert to' from the 'Image' menu but this time make sure that the 'RGB true-color' box is checked, then press 'OK'. Once the image has been converted, click the 'Edit' Menu, and select 'Copy'. This places a copy of the 24-bit green image on to PHOTOLAB's clip-board. Now load the blue image and convert it to 'RGB true-color' in the same way. Once this process is complete, click the 'Combine' option in the 'Image' Menu. This opens up a set of eight possible ways of

combining the two images. For the present, select 'multiply' (though the 'blend' option, where you can select which percentage of each image you wish to combine, is well worth exploring). When the combination is complete, don't forget to use the 'Convert to' option to grey-scale the image before saving it as RED.BMP.

Creating the Tri-colour Composite Image

Now that you have red, green and blue images, you can embark on the process of producing a colour composite weather satellite image. Load BELMONT IMAGE TECHNICIAN, and click on the 'Merge' Icon. This opens the 'Merge Window' containing four blank picture windows labelled red, green, blue and preview, as well as an icon area containing three prominent floppy disk icons, also coloured red, green and blue. Click on the red disk and load the image RED.BMP. Repeat for the green and blue images, and when all three windows contain their respective images, click on the 'Merge' Icon. The process takes a minute or two for the composite image to appear in the Merge Window. At this point, click on the 'Save' Icon, type in the name for your creation, and save it as a GIF file.

Although pleasing results are generally obtained first time by following the above procedures, images do often show a distinct colour bias towards either blue or green. There are various ways of trying to correct this. One method already alluded to is the 'Blend' option in PHOTOLAB. Using this, a greater or smaller proportion of blue or green can be included in the red image to provide a more balanced coloration. A second method is to explore and fully utilise the image enhancement features of BELMONT IMAGE TECHNICIAN. Individual images can be transferred from the merge window to the main window for histogram stretching/compression, filtering, brightness/contrast enhancement and gamma correction etc., then passed back to any of the merge windows by means of the 'Transfer' Menu and re-merged.

Images from Meteosat have the advantage of three different image types with which to work, namely visible, infra-red and water-vapour. Interesting false-colour images are readily produced by assigning these three images variously to the red, green and blue buffers of BELMONT IMAGE TECHNICIAN, and merging them.

Memory Problems

If your PC has less than 8 megabytes of RAM you may find difficulty in merging even 640*480 PROsat II screens. One solution is to go back to PHOTOLAB which has a very good image cropping facility. With this you can easily crop your BLUE.BMP and GREEN.BMP down to identically sized smaller images. Load the blue image, and select 1000% from the 'Zoom' Menu. This zooms into the image so that individual pixels are easily accessible. Next, click on 'Select' under the

'Edit' Menu, which converts the cursor into a cross-hair. Holding the cursor down over any pixel, then dragging out a rectangle, displays its co-ordinates and dimensions in the title-bar in the form (100,50)-(180,75) 80x25. These are respectively the co-ordinates of the starting pixel, final pixel, and width x height for the image segment. Draw out a suitable rectangle, noting the co-ordinates of the starting pixel, and the final (width x height), then release the mouse. Selecting 'Crop' under the 'Image' Menu immediately removes all pixels outside the selected rectangle, after which the new blue image must be saved. Repeat with the green image, taking great care to start the cropping rectangle at the same co-ordinates as before, and drawing it out to the same width and height as the blue image. Finally, crop and save the new green image. Once a red image has been fashioned from these images, you should be ready to make your composite.

Overview - The Software

PHOTOLAB, required for accurate cropping of images, and for the production of the red images for use in the merging procedure, is available on RIG Shareware Library Disk I-02, and registration costs $30 US. BELMONT IMAGE TECHNICIAN is available on RIG Shareware Library Disk 'Belmont'. In addition to the program files, this disk contains the directory DISC 2 which, in addition to the Manual in Windows Write format, contains a number of greyscale colour separation images of astronomical objects for you to experiment with, as well as a number of filter matrices which can be loaded and utilised. Registration is normally £60 but, as a special offer to RIG members only, is reduced to £40 until December 1994. If you require a bound, hard-copy manual, the cost of registration is £50.

To register, send your name and address, stating that you are a member of RIG, along with the requisite licence fee, to: Belmont Imaging, 22 Easter Belmont Road,Edinburgh EH12 6EX. ⊕

RECORD LOW TEMPERATURE IN AUSTRALIA

Internet message from c9224109@wombat.newcastle.edu.au at University of Newcastle, Australia timed 08:51 on 29 June 1994:

It's official! The coldest ever recorded temperature of -23C occured at 2.00 am on June 29 Australian eastern standard time at Charlotte's Pass (approx 1900m above sea leve) in the Snowy Mountains of NSW. The previous record stood at -22C set in 1945. A slow-moving cut-off low in the Tasman Sea had dumped over a metre of snow in the area and the deep high that replaced it stabilised the already cold air and presto! Ashley. ⊕

JVFAX - FREQUENTLY ASKED QUESTIONS... ANSWERED (Part 1)
Mark Pepper

Introduction

JVFAX has become very popular amongst RIG members over the last year or so and as a result has been the topic of many calls I've received in my capacity as RIG microcomputer specialist. This two-part article is based largely on a text-file written by Dave Moisan but also includes questions generated by RIG members. Dave Moisan's file covers the use of HamComm, PKTMON and JVFAX and takes a questions and answers form but I have taken only the relevant JVFAX sections for use here.

HamComm and PKTMON are RTTY and packet radio decoding programs respectively and can use the same simple comparator interface as JVFAX. HamComm and PKTMON are not covered in this article but if the reader is interested, the complete text document RTTY_FAX.ZIP, HamComm and PKTMON are available on the RIG BBS and from various sites on the Internet.

This article also refers to version 6 of JVFAX. Version 7 will shortly be available and may have some slight appearance and key sequence differences from V6.0 but the basic operation should be the same.

In part 1 I will cover obtaining JVFAX, what system requirements it needs and how to configure it for use with your hardware.

Definitions

In this article reference is made to HF FAX and APT. Unfortunately, the two terms can be confusing, so the following are the definitions used here.

HF FAX refers to terrestrial facsimiles (FAX) transmitted as frequency modulated (FM) signals which are, in turn, used to amplitude modulate (AM) radio frequency carriers. They are transmitted by both weather bureaux (such as the Met office in the UK) and press agencies. Meteorological HF FAX charts usually take the form of weather charts but sometimes include satellite images.

APT stands for Automatic Picture Transmission and as such describes both the terrestrial transmissions described above and the transmissions from polar and geostationary satellites. However, here the term 'APT' FAX will be used to refer to the transmissions from polar-orbiting (NOAA & Meteor) and geostationary (Meteosat & GOES) satellites. These are AM modulated signal which are, in turn, used to FM modulate radio frequency carriers.

Where can the software be obtained?

JVFAX is available from a number of sources on the Internet, including the Simtel mirrors (such as wuarchive.wustl.edu) and nic.funet.fi (/pub/ham/misc). JVFAX is also available from the RIG Shareware library and the RIG BBS. Many other BBSs also carry JVFAX. Version 6.0 should have a file name looking something like JVFAX60.ZIP and version 7 will probably look like JVFAX70.ZIP.

What are the basic computer requirements?

JVFAX only runs on true IBM PC compatibles of the 286 or better variety with at least 1Mb RAM and a largish hard disk. Note that JVFAX has its own extended memory driver which might conflict with QEMM and other memory drivers. However, version 6.0 does work with HIMEM.SYS. To my knowledge JVFAX should not work with IBM emulations such as those found on the AMIGA and Archimedes computers but the new Acorn RISC PC may prove to be an exception.

What are the basic receiver requirements?

I've successfully received HF FAX with my Sony ICF-SW55 digital portable. Receivers like this will work but table top radios (Kenwood, Icom and Yaesu) and ham transceivers are much more suitable for this application. The receiver must have a Single Side Band (SSB) mode and be able to receive signals somewhere in the range 100KHz to 30MHz.

For APT FAX a SSB radio can be pressed into use but satisfactory results generally require one of the dedicated satellite receivers such as those sold by Cirkit, Maplin, Dartcom, Martelec and Timestep. The receiver for APT should cover the 137-138MHz band for the polar-orbiters and 1.6945 and 1.6910GHz for the two channels of Meteosat. Usually, a down-converter is used to drop the Meteosat frequencies to 137.50MHz suitable for a polar-orbiter receiver.

Where can I find plans for an interface?

Plans are included in the documentation for JVFAX and include schematics for both the basic HF interface and a more sophisticated HF and APT interface. Plans for an APT interface can also be found in my other article in this issue.

I don't want to build it. Can I buy a ready made interface?

Many interface systems are now available around the world. The JVFAX documentation lists several available in Germany and Dave Moisan quotes William Nolle as selling his version of the interface in the USA. This is called FAXCAP. Contact him

at: 122 Phillips Rd., Hazel Green, AL 35750, USA. Dave also quotes Dieter Dippel as selling an interface (with surface-mounted components) which includes JVFAX and HamComm. Contact Dieter Dippell, DF4RD, at Fenitzerstr. 33, D-90489 Nuernberg, Germany.

In the UK interfaces are supplied by the following manufacturers:

Pixel Plus Developments - APT interface, (see article in this issue) Smithy Farm, Nailstone, Nuneaton, Worcs. CV13 0PZ. 0530 262565.

Martelec Communication Systems - HF, APT & SSTV interface, available now. The Acorns, Wyck Lane, East Worldham, Alton, Hants. GU34 3AW. 0420 82752.

Pervisell Ltd - HF interface available now, APT interface available soon. 8 Temple End, High Wycombe. HP13 5DR. 0494 443033.

Should other JVFAX compatible interfaces be available, firstly please accept my apologies for not mentioning them here. Secondly, I would be only to happy to pass their details on, should they be made available to me.

How does the simple HF interface work?

This is a zero-crossing detection circuit, made up of a 741 connected in an open-loop configuration. For every zero-crossing (twice a cycle), an interrupt is generated. JVFAX measures the time between successive interrupts using the PC's timer.

How do I connect it to my radio?

Simply run an audio cable from the interface box to the earphone/headset output, record output, or data output of your radio. Note that the simple HF interface needs 100 mV of audio to work, but most rigs can easily supply this.

How do I set up JVFAX?

Select "Configuration" from the main menu, and you should see the Config screen. Various options are set from this screen using the arrow keys to select, and the space bar, - or + to set each option. Here are the options you need to set:

Demodulator:

For the simple comparator interface, set to "8 bits" and "Comparator". Specify the address and IRQ according to the following table. Note, however, that serial port addresses have been known to be completely different from the above so, if none

```
                    (JV)-FAX 6.0 configuration screen


   Demodulator: 8 bits serial port      addr: 03E8  IRQ: -   LSB-SSTV-sync: yes

   Modulator:    6 bits on speaker      addr: 0000  Bdrate: 9600  Dtarate: 4800
   _____

   Graphics:     other SVGA (256 colors)    |  HIRES-movie:              no
   SSTV-graph.: ET4000 1024x768x256         |   Enable scrolling:        yes
   Printer:     HP-Laserjet 500+ 300 dpi    |   Formfeed at end of pict.: no
   _____

   Allow tone alert at end of picture:   no  | Max. interrupt frequency: 7500
   Enable autolock when ATC is on:       yes | Clock-timer frequency: 1193551
   _____
   Default picture directory:
       c:\graphics\gif
                                          | UTC time diff:            0
   Store pictures in GIF89a:        yes  | Miscellaneous settings:
   Callsign:                             | program starter config:

   Select graphics mode with <+> or <->. Hit <ESC> to customise SVGA-parameters

            Hit <Ctrl>+<Enter> to terminate configuration session
```

of these addresses and interrupts work refer to your computer's manufacturer for
further information.

Serial Port	IRQ	Address:
COM1	4	03F8
COM2	3	02F8
COM3	4	03E8
COM4	3	02E8

For other interface types (non simple HF) refer to the manufacturers installation
instructions. For example when using the Martelec JVFAX interface set the
demodulator type to "8 bits" and "Serial". Specify the serial port address as above,
no IRQ is needed.

Graphics and SSTV-Graph:

Set this as appropriate for your system. Most users can specify "Standard VGA
640x480". If you have a Super VGA card, see the next paragraph, otherwise skip
ahead to "Printers".

Configuring Super VGA:

You can choose between 16-color SVGA and 256-color SVGA, the latter being re-
quired if you intend to view false colour weather pictures and for resolutions higher
than 800x600. Press ESC to enter the "Customise SVGA Parameters" option and
complete the following items.

Chipset (256-color only):

Select the name of the chipset present in your SVGA card. This is usually specified in your users' manual or can be found by looking for a name on one of the chips on the video card. Look for names such as Trident, Genoa or Paradise. The ET4000 chipset is supported by a separate option from the main config screen.

The JVFAX documentation lists settings for many popular cards but if your video card is not supported directly by JVFAX try one of the VESA modes. Failing this use the standard VGA 640x480 mode.

AH/AL:

Enter the register values for the video mode you want. These values can be found in your SVGA card manual or in the documentation for JVFAX.

```
        customise SVGA parameters
¦                                      ¦
¦ Chipset:                             ¦
¦             Trident                  ¦
¦                                      ¦
¦ AH:00h AL:52h BH:00h BL:00h          ¦
¦                                      ¦
¦ Dots per line:           640         ¦
¦ Number of lines:         480         ¦
¦ Screen aspect ratio:   10000         ¦
```

BH/BL:

Some SVGA cards, particularly VESA standard cards, require this register pair to be set as well. Other non VESA cards generally like these registers set to 00H, the exception being the Video 7 chipset cards.

Dots Per Line / Number Of Lines:

Here you can set the horizontal and vertical resolution required of your display. Usual values are 640 x 480, 800 x 600 or 1024 x 768 but these can be set to other values if your video card supports them.

Aspect Ratio:

This is normally set to 10000 for standard (3:4 aspect ratio) screens such as 640x480, 800x600, etc. It is calculated with the following formula:

$$(Lines / (Dots * 0.75)) * 10000.$$

You will need to press CTRL and ENTER together to exit this section and return to the main configuration screen.

Printer:

Most popular dot matrix printers and the HP Laserjet are supported. Unfortunately, PostScript printers cannot be used directly with JVFAX. Most dot-matrix printers

emulate either the Epson 9 or 24 pin printers and so very often an appropriate emulation can be selected. The same goes for the majority of laser printers. Where your printer does not have one of the standard emulations, the appropriate printer control codes can be entered by pressing 'ESC' from the printer select section and entering them in the menu provided.

```
    Customise printer parameters
¦ Printer name:                      ¦
¦ HP-Laserjet 500+ 300 dpi           ¦
¦ Dots per line:            2288 ¦
¦ Aspect ratio (hor./vert.)1.00 ¦
¦ Number of pins used:        1 ¦
¦ Bytes for one column:       1 ¦
¦ number of pins per byte:    1 ¦
¦ Uppermost pin is LSB:      no ¦
¦ Interlaced printing:       no ¦
¦ Printer initializing string:  ¦
¦ 1B 2A 70 30 58 1B 2A 70 31 30 ¦
¦ Graphics string:               ¦
¦ 1B 2A 62 32 38 36 57           ¦
¦ Interlace-linefeed:            ¦
¦                                ¦
¦ Interlace-linefeed:            ¦
¦                                ¦
```

Enable scrolling:

This determines whether faxes will scroll off the screen when being received. Set this to "Yes".

Default Picture Directory:

Enter the disk and directory where you would like your fax images to be stored, e.g. "C:\WEFAX".

Store Pictures in GIF 89a:

JVFAX uses the GIF 89a standard to store special information about each fax, such as mode, LPM and IOC. Unless you're using other GIF software that can't handle this standard, leave this enabled ("Yes"). If GIF 89a format is chosen, images from Meteosat will be displayed upside down when viewed with other viewing utilities. This is perfectly normal and is as a result of the method JVFAX uses to save image data as it is received. Meteosat images are transmitted from the bottom up so are saved in the GIF file upside down. JVFAX can display them the correct way around because it can read the orientation information it saved along with the file while other viewing applications cannot read this information.

Miscellaneous Settings:

Hit ESC to enter yet another configuration menu. There are just a few settings you need to make here:

Quicksave:

This feature lets you save the last picture received. It works by continuously capturing faxes to a .GIF file, which may become very large. Unless you have lots of hard disk space, set this "off".

Initial RX Mode:

This is the mode that JVFAX will be set to just after the program is executed and FAX receive mode entered. Almost all HF FAX transmissions will use mode 1 whereas geostationary and polar-orbiting satellites use modes 2, 3, 6, 7, 8, 9, 17 and 19. This should be set to your favourite or most frequently used FAX mode.

Disable XMS use:

Set to "No". Normally, if HIMEM.SYS is loaded by DOS, JVFAX will use it to manage memory. With some DOS/BIOS/hardware combinations, this may cause problems (blank pictures, lock-ups, etc.) so you may need to disable XMS (set parameter "Yes"). This will degrade JVFAX's performance so leave it set to "No" unless you are actually having problems.

Hit CTRL and ENTER together to leave this menu. Hit CTRL and ENTER together again to return to the main menu.

Next time I will conclude this article, covering how to obtain satisfactory pictures from JVFAX and where to find suitable FAX transmissions.

Further reading

Guide to Facsimile Stations, Klingenfuss.

JVFAX documentation. ⊛

MEMBERS' ADVERTISEMENTS

Members may advertise surplus equipment etc. for sale in the Journal free of charge but subject to space being available. Advertisements should be concise and must be for goods relevant to RIG activities. They should be submitted to the Journal Editor and not the Advertising Manager.

FOR SALE Timestep HRPT system comprising HEMT preamp, receiver, PC data card, software, cables, manual etc. MUST SELL. Offers around £685. Paul Chamberlain, G4XHF. 0293 515201 (evenings) or 0622 696437 (day).

FOR SALE 1.8m DISH, solid, precision-spun alloy. Accuracy better than 0.5mm. Seated on a dual steel ring. Motorised equatorial mount with pointing accuracy 0.3 degree. Buyer to collect. First offer of £250 will secure. Dave G7FGA York 0904 790079.

MARTELEC'S JVFAX INTERFACE UNIT
Peter Dobson

Well over 150 JVF1 interfaces have been sold world-wide at the time of writing and early users have been very enthusiastic. To date there have been about 15 pleas for help which, for a new product designed to a price with as many facilities as far more expensive interfaces, is not bad. The following notes summarise problem areas of some users and suggest solutions.

1) The brown paper effect. This shows itself on APT mode only when used in asynchronous mode. The effect is very subtle, and consists of a fine set of vertical lines down the picture. These lines are weak in as much that they are most predominant on whites and tend not to be visible at all on darker grey shades. The vertical line spacing is 4 pixels apart in Meteosat mode. The cause of this is to do with the way the software samples the incoming data and then queues it before transferring it out to the host computer. The effect is not present in the optional synchronous mode at all and we are currently looking at ways of amending the software in the PIC processor to overcome the effect. In the mean time the simplest way to resolve the problem is to use the interface in synchronous mode all the time for all APT reception.

The original reason for offering both synchronous and asynchronous modes was that sync mode can be used with tape recorders and LEOs (low earth orbiters) and will automatically track any frequency changes due to tape wow and flutter or LEO Doppler shift. However, if the signal is lost even for a short period then picture phasing is also lost and a break will appear in the picture.

Async mode does not depend upon the carrier frequency and the APT signal is restored to baseband (DC signal) before being digitised at a sampling rate governed solely by the JVFAX programme. As a result this mode can ride through temporary loss of signals without upsetting picture phasing. However, it cannot accommodate Doppler shift or wow and flutter from a tape recorder.

2) Grainy reception on APT. We found one interface unit during production testing which exhibited a very high open loop gain on the precision rectifier stage of the APT channel. This high gain (a rather better TL074CN amp than the manufacture intended!) caused the rectifier to break into parasitic oscillation. The effect on the received picture is to introduce a very grainy effect on the received picture which makes it look as though there are not 256 shades of grey but far less (eg 16). This effect was readily corrected by adding a 47pf capacitor between U2 pins 5 and 6. This reduces the bandwidth on this stage and should stop the parasitic oscillations.

3) Horizontal lines on FAX reception on an otherwise clean image. This is caused by a slight hiccup in the FAX channel design. The result of this is that the FAX channel is not as sensitive as specified in the documentation. To get good results from the existing design the input level from the communications receiver must be at least 300mV peak to peak. Signals as big as 2 Vpp can be accommodated by the interface card without overloading the filters. There is a fix to improve the input sensitivity to that specified in the documentation which is detailed below. The simplest answer is, however, to increase the output level from the communications receiver if at all possible. In fact doing this will improve the quality of the images too. We have been using a Yaesu 8800 receiver which outputs 2 Vpp on the line output connector on the back which is one of the reasons we have not noticed this effect before.

For those of you who want to improve the sensitivity of the FAX channel the following components should be changed:

Change R34 from 4K7 to 100R.
Change R33 from 22K to 470R.
Add 47 pf between U14 pin 1 and U14 pin 3.

These three changes improve both the speed and stability of the comparator stage within U14. We suggest that if you do nothing else, at least these three components should be changed as outlined above. One or two interface PCBs have been reported as having unstable comparator stages. This usually manifests itself as interference transmitted from the interface PCB to the upstream receiver.

These changes should restore the input sensitivity to about 70 mV RMS. It still applies however, that the larger the input voltage supplied to the card the better it will work up to the 2 Vpp level.

4) Fax centre frequencies for 150 Hz deviation and 400 Hz deviation are approximately 70 Hz apart. This is a function of the way the software in the PIC operates and is actually correct. To obtain the best results when changing mode it might be necessary to tweak the tuning of the receiver to obtain the best results in each of the different deviation modes.

5) Histogram comb effect for all modes of operation. In this certain grey scale values can be seen to have a preference over neighbouring grey scales regardless of the incoming signal. This is seen as 16 or so short, vertical lines equally spaced across the histogram display (like an inverted comb) but does not effect the quality of the received picture. The effect on the system can be to cause unreliable starting and stopping of pictures. None of the three computers we has has shown this

effect and we have only had one report of this effect. We thought the cause was due to the fact that some RS232 serial interface cards require a bit more than the spec -3 V to recognise a low state input. We devised a cure to this problem and asked the user who was experiencing this problem to try the modified unit for us. The mod we came up with did not appear make any difference to the comb effect. To help us understand this problem further, we would be interested to hear from any other users who might be experiencing similar effects.

6) The whole unit appears to jam up. More specifically, no output is seen from the PCB and all the red LEDs refuse to move, but the green LEDs correctly respond to mode changes selected at the JVFAX programme. This is caused by the fact that the interface PCB is not receiving any RTS signals from the host computer. RTS is, in fact, the prime timing signal used by the interface card and without this signal there is no conversion activity on the interface PCB at all. We have found that some PC manufacturers install optional links on the RS232 interface which allow the interface to be set up to meet different needs. One of these is to set RTS permanently high (to do with the operation of certain types of modem, we believe). The cure to this problem is to check whether RTS pulses are being issued by the host computer (to pin 7 of the 9 way connector on the JVFAX interface PCB). If not, then the RS232 interface configuration should be checked to correctly set RTS to be under software control.

Don't forget that on the PCB the 9-pin connection to the host machine should be arranged such that pin 1 and pin 9 are swapped as are pins 2 and 3 for each end of the cable. Martelec can, in fact, provide a cable to interconnect between host and interface unit which corrects these problems.

7) SSTV operation. Many users have expressed an interest in the use of this interface for SSTV operation. The hardware hooks for SSTV were incorporated from the outset but details of the operation of SSTV only reached us recently. As a result, the software written for the PIC was unsatisfactory. This problem can be resolved only in software and revised PIC software is being developed. It should be said that the original spec for the interface card did not include SSTV and this was added as an incidental after-thought. ⊛

FOR SALE   YU3UMV type framestore, cased with integral power supply. Numerous mods incorporated - Xtal controlled tv sync, built-in LOK selector, 2.4kHz sync/recorder generator etc. £120 ono. Tom Bratton, Leicester 0533 607681

A NEW-BORN RIGLET
Keith Atkins, G7MPT

The problem is "Where do I begin?". How many times have I, and others, re-peated that phrase? As I sit here, writing this report, I cast my mind back some eight months to the time when I was still an unconceived Riglet. Oh yes, I had passed the RAE - God only knows how - and I had a little experience on the two-metre band. I also had an inherent interest in the weather. Well, most people in Britain do, don't they?

Here I am; one of Mike Robinson's prodiges, but who am I? Well, I am am a family man, with most of the offspring having flown from the nest, living in Preston, Lancashire in a flat above my wife's business. Part of this flat is, or was, the office. It now holds a computer (for business use, of course!), a two-metre transceiver and a multi-mode transceiver for HF bands and now, a PROscan receiver. Above this "office" I have a Slim-Jim 1/2 dipole and crossed-dipoles.

I work full-time but it was my spare-time activities which steered me towards weather satellites and RIG. With hobbies like potholing and mountain leading, who could possibly deny the link with weather? So how did some rational-think-ing human ever get into such a fascinatingly different hobby? The answer is with time, patience, difficulty and a lot of help.

In December 1993 I read RADCOM and saw an advert for RIG so I sent for details to see if they would whet my appetite. I joined and got some back-issues of the Journal. The pictures looked nice and colourful and the quality superb. Well, I had the computer so what else did I need and where do I get help from? I am not, definitely not, electronics literate. It was suggested that I get in touch with Mike Robinson, some 30 km away. Does this man really want me bothering him? I asked myself. He has probably got better things to do. Anyway, I gave him a ring and introduced myself. I found Mike very helpful and he invited me to visit him and see his set-up. One thing I learnt in my early radio days was to get the XYL interested in what you're doing and take her to the rallies where there's an alterna-tive interest for her. Now Accrington, where Mike lives, has a bustling market and a good shopping centre. Ideal for an afternoon out, XYL and all. What would I find? The Journal listed things I'd never heard of; crossed-dipoles, down-convert-ers and PROsat cards. What size is a dish and will it receive the satellite TV pro-grammes I had promised my wife? Just what do I need to get started and receive pictures like I had seen in the Journal?

Having seen Mike's equipment I came away with a shopping-list and duly sent away for some. It arrived in due course but I must admit that it was left untouched for two months. Then came the time for action. The Tandy man who sold me the

wire (sorry, co-ax) told me where to put the preamp and I actually wired the plugs in myself. Also, and for the first time, I opened up the computer to slot-in the PROsat card. Now, what happens next? I found Timestep's instructions a little confusing for the power to the PROscan receiver but what I needed was a 3.5mm power plug. I had several plugs, some power and some not. Some were too fat and some too thin yet all 3.5mm. Off to Tandy to buy some more but I found they were similar. Surely a 3.5mm jack fits all 3.5mm sockets? Most confusing.

The approaching weekend was to be fine and sunny and there happened to be a Radio Rally at York. Superb! but what about the XYL? Well, with a little persuasion we both set off to buy one 3.5mm plug 180 km away. Sure enough at the first counter I found the plug so could spend the rest of the morning buying other items and checking out satellite TV for the XYL. The bonus of the day was meeting Henry Neale on the RIG stand.

That evening I wired everything up, switched on the computer and waited for a picture. Nothing, not even the bleep-bleep of a satellite. Over the next few days Mike got several frantic calls but it seemed I was doing everything right. "That makes a change" I heard the XYL say! Was it the antenna? Was it the PROsat card
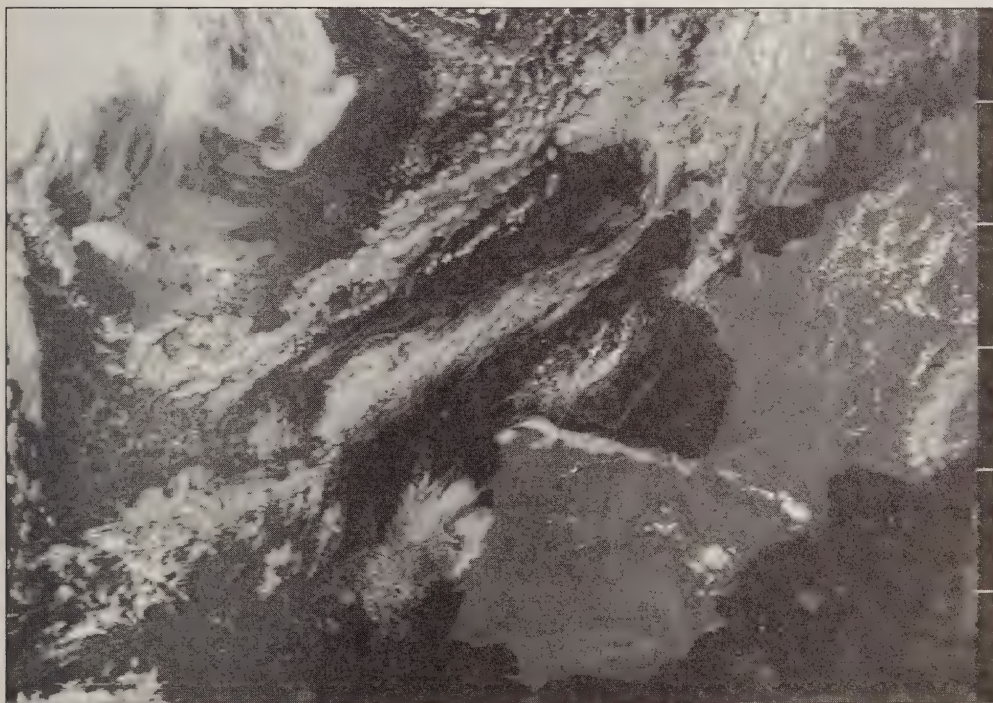
NOAA 11 21 July 1994. Image by Keith Atkins

or the output level? Suddenly, it dawned on me. After I disconnected the PROscan to wire up the DC supply I had forgotten to reconnect the antenna! Next time around the image came up but it was nothing like I had seen in the Journal. I was getting only the bottom 1/3 of the screen covered so was there still something wrong? Well, this really tested my patience until, finally, another call to Mike. Boy!, am I glad I made that call! Section... Display.. Zoom in and... NOAA strikes back! The wine bottle was cracked open as one-by-one the NOAAs appeared. There will be no business letters on the computer now whilst NOAAs and Meteors are passing.

This was just the start of the learning curve. I have yet to try colouring images, measure temperatures and print images. Then there's that dish and down-converter for the geostationary side of the hobby. Already I have 4 Hams itching to see the fruits of my labour and a local Radio Club wants a talk on the subject - but not yet! For me this is just the beginning of a fascinating interest; a sideline in Amateur Radio; a window on the world. I feel part of an extended family, all keen to advise, discuss and assist me in my new-found hobby. A very close-knit group and one well worth joining. Thanks to you all. ⊕

METEOSAT STATUS REPORT

METEOSAT 3 continues as the operational satellite at 75 degrees W but with increasing inclination due to fuel depletion. It will remain there until replaced by GOES-8, which is currently under test at 90W, before the end of the year. After the changeover, METEOSAT 3 will be moved to 50W and switched off.

METEOSAT 4 is in standby mode at 8-10W.

METEOSAT 5 continues as the operational satellite at 0W. It is planned to return to the 'on-time' schedule (with D2 images at 30 and 58 minutes past each hour) during September.

METEOSAT 6. Investigations continue into the IR and WV imaging problems. The visible images are good but intermittent 5-6% gain variations in IR and WV readings degrade the accuracy of temperature measurements. There is a mechanical problem in the radiometer/optics system which, it is hoped, can be compensated for with ground-based processing. This satellite is positioned close to METEOSAT 4.

We are grateful to Gordon Bridge, Meteosat Operational Programme Manager, EUMETSAT, for making this information available just before our press deadline. ⊕

AN ALTERNATIVE VIEW OF HRPT
Peter Hayes

So now you've got your nice new NOAA HRPT ground station. You're receiving some remarkable images and having a wonderful time but after a while you wonder what you could do with these superb pictures; they're great but you begin to feel there must be so much more you can do with them than just admire them on the computer screen. Well there is...

Vistapro is a "virtual reality" program designed to convert altitude data into landscape images. The original version, Vistapro 1.0, was restricted to "Digital Elevation Maps", DEMs, derived from data supplied by the US Geological Survey but the current release, Vistapro 3.0, can import data from PCX image files. All we need is a PCX file of a suitable HRPT pass and we can generate a landscape image. The best images to use appear to be HRPT Channel 4 IR images taken at night, possibly in autumn or winter. On a clear, settled night the temperature gradient from sea level to the highest mountain tops can be reasonably linear, thus giving us an opportunity to generate an altitude map. Download a pass with the area of interest as nearly centred as possible, thereby producing the highest resolution starting image. After contrast stretching, save the image as a PCX file, then import into Vistapro and have some fun.

There are two ways to import images into Vistapro but the one I find that works best is to load the image using the "Load PCX" option from the "Load" menu. You then call up "View -> Dem" from the "ImpExp" menu. Select the "Intensity" option, and your satellite image will be converted to a fairly accurate altitude map, ready to be worked on by Vistapro. You'll then have to fiddle with things like the sea level and smoothing options to get the best results but, eventually, you'll find the best settings for your image. Scaling will also need some tweaking as the area covered by your PCX file is much greater than Vistapro expects, so scaling by 0.1, or even 0.05, brings hills into proportion. Towns can be a problem if they're warmer than the sea, as they'll be interpreted as being below sea level and Vistapro will treat them as seas or lakes and fill them up with water! This problem can be avoided with a little cheating. Load your PCX image into any paint program and patch out the offending towns before you load it into Vistapro. You can do any amount of cheating you like, but part of the fun is seeing how realistic you can make the final image using the original unretouched satellite data.

Vistapro also allows you to add haze and clouds to generate depth and perspective. You can light the landscape from any direction and simulate any time of day. You can choose your height above sea level, the viewing angle and many other parameters and add grass, trees, snow, etc. With care and patience, and a knowl-

edge of what your selected landscape really looks like, it's possible to generate images not too far removed from the real thing. Having found the parameters to produce a fair representation of somewhere you're familiar with, use the settings on unfamiliar territory and see what happens. You don't need to be limited to NOAA satellite images as your starting point. Voyager images of Jupiter's turbulent volcanic moon Io, as well as Uranus' bizarre moon Miranda, provide excellent raw material for Vistapro. Your results probably won't match reality as there is no easy way to generate valid DEMs from the Voyager images but, nevertheless, you can sometimes produce really convincing pictures. Voyager images are available on a 14 disk CD-ROM set from Technomatic. Also on the CD-ROMs are radar-generated altitude images of the US which can provide good raw data, eg, the Grand Canyon and the Hoover Dam.

It is also possible to "pilot" an aircraft through your landscape. Within Vistapro is a facility to generate an animated sequence of images to simulate straight line flight through your landscape. A separate program "Makepath Flight Director" will allow you to generate very complex paths with the ability to alter your point of view during your journey. You can generate your animation using Vistapro's own animation format, VANIM, which can then be played back using the supplied utility, "Viewer". Alternatively, you can generate a series of PCX images but you will need to supply your own viewer. With a fast hard drive you can run VANIM at around 15 frames per second, not really fast enough to give smooth motion. If you have a fast 486DX-66 or similar, together with sufficient RAM configured as a ramdisk, you may be able to run your animation at 25 fps or so. Beware though, these files are enormous, several tens of megabytes for a "movie" running only a few seconds. They also take a very long time to generate, each frame can take ten minutes or more to draw, depending on the level of detail you're trying to achieve, so a lengthy sequence can take several days. Fortunately you can suspend the animation generator at any time and restart it later from where you left off. There is also a morphing program which allows you to blend one image into another over a number of frames so, for example, you can change the angle of the lighting during your flight.

The montage reproduced on the inside back cover shows some landscapes generated from a channel 4 HRPT image of the west coast of Scotland. This sort of landscape, with islands, inlets and rivers, seems to work best with Vistapro and provides plenty of opportunity for varied flight paths.

[Vistapro v 3.0 is available in the UK. PC Extra on 0706 222988 quote £59 and £89 for the disk and CD ROM versions respectively. Prices include VAT. It is also available directly from the producer in the US. Contact Virtual Reality Laboratories Inc. on (805) 545 8515 Ed] ⊛

THE CLEMENTINE SPACECRAFT
Peter Wakelin

Clementine was the first US spacecraft to head for the Moon for over 20 years and the project is managed by the Ballistic Missile Defense Organization. Clementine was built by the Naval Research Laboratory and its instruments were constructed by industry and the Lawrence Livermore Laboratory. Its mission was to image the Moon and then proceed via a close Earth fly-by to the asteroid Geographos as well as test 23 advanced military technologies. It was launched by a Titan-2G from California on 25 January 1994 and remained in low Earth orbit for nearly 9 days before being accelerated towards the Moon.

It took images of Earth before and after the trans-lunar injection burn and compared with earlier lunar missions its imaging capability was phenomenal with up to 5000 digital images in each 5-hour lunar orbit. In just over two months it took 1.5 million images before leaving Moon orbit for Earth swing-by. On 9 May a computer fault caused the spacecraft to use up all its attitude control propellant which rendered the Geographos mission impossible.

Spaceflight (April 1994, p130) quoted an official of the White House Office of Sci-
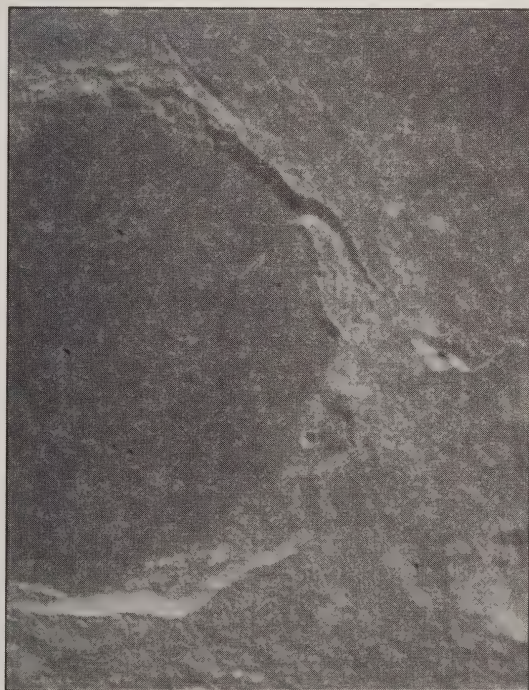
Plato Crater
**UV/Visible
Camera**

Filter: 1000 nm
Altitude: 1000 km
Lat: 52°N
Long: 10°W
Orbit#: 40
Time: 13:53:16 UT (Z)
Date: 28 Feb 1994

N
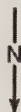
ence and Technology as saying that the plan to supply the images directly to Internet for computer access should enable the public to "reach in and touch the space programme directly...[and]...fly around the Moon with their mice". I am reproducing two of Clementine's images which I obtained from Internet. ●
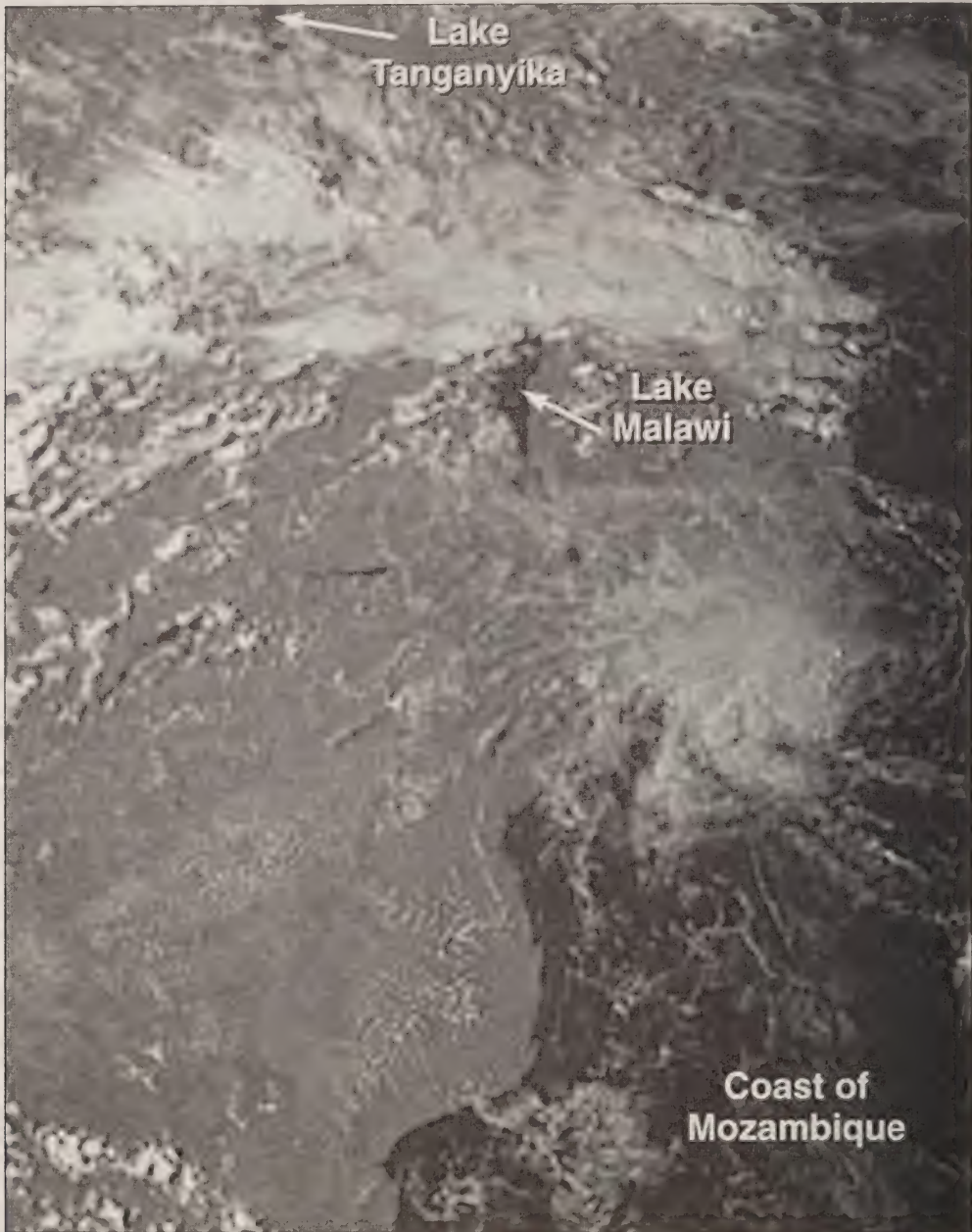
INTERPRETING WEATHER SATELLITE IMAGERY - PART 9
Peter Wakelin

During the second week of July this year the south of England enjoyed several hot days with the temperature around 30 degrees while the north had cool and dull weather with outbreaks of rain. One of the reasons why such a marked contrast can persist for several days, or even a week or more, is the presence of a slow-moving front. My images received on 11 July show a good example of such a situation. The higher resolution NOAA images also show some other features which I will explain.

In earlier articles in this series I have shown that the polar front is often associated with strong, high altitude winds (the jet streams) and the formation of depressions. You may well be wondering how, with so much wind around, a front can remain stationary. In RIG 36 (page 22) I said that if conditions are right a depression may form on the polar front without explaining what the right conditions are. A full explanation is beyond the scope of this journal but it is sufficient to say that in a situation as illustrated here the winds are blowing along the direction of the front at all levels, ie with very little or no component across the frontal boundary. In figure 1, based on the 00UT surface analysis from Bracknell, there is very little pressure gradient along the front at all. Between the Azores and Norway the pressure remains very near 1016mb. Similarly, up aloft, there will be very little compo-
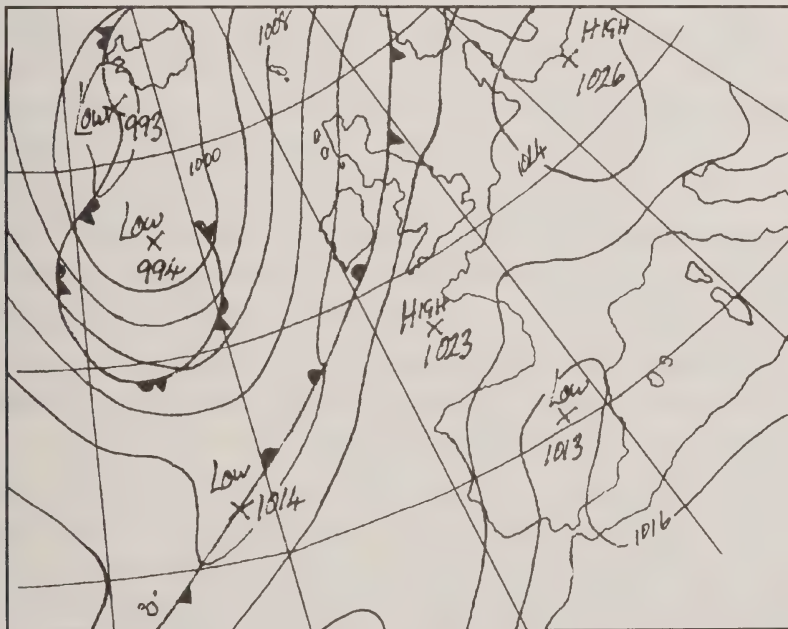
Figure 1. Surface Analysis, Bracknell 11 July 94 00UT

nent across the front but perhaps 50 m/s along the direction of the front. The forecast surface pressure chart (figure 2) shows very very little movement of the surface front in 24 hours.
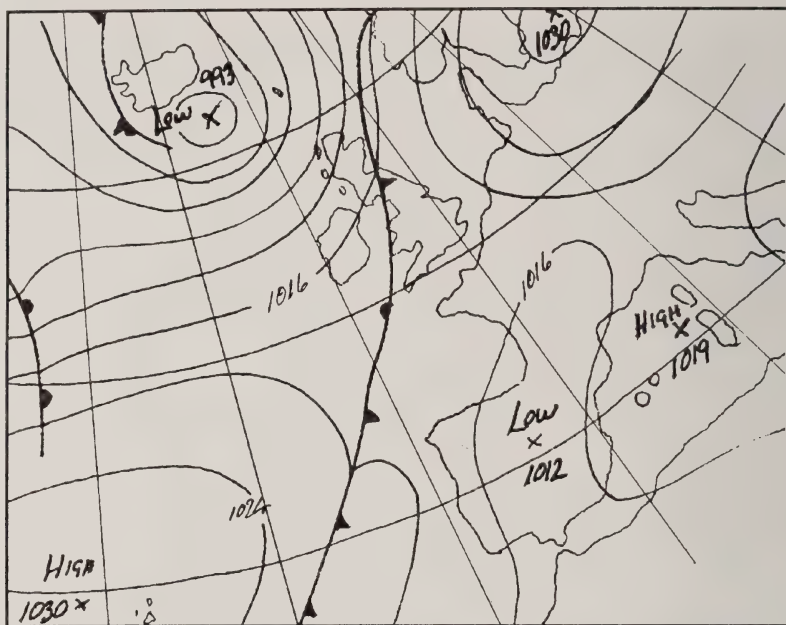
Figure 2. Surface Forcast T+24, Bracknell 12 July 1994 00UT

Although depressions will not form and deepen in such a situation small ripples can occur on the front and move along it at considerable speeds, typically around 1/3 of the speed of the strongest winds aloft. The ripples can often be seen on the satellite images as a broadening of the frontal cloud and, on infrared images, as a brightening too, indicative of air being forced to a greater (colder) height by increased convergence at the frontal boundary. Not surprisingly, a marked increase in rainfall is usually associated with these ripples. It is these situations that cause the biggest problems to weather forecasters and the highest numbers of wrong forecasts in the eyes of the general public. Just a small error in the position of the front or the forecast position of a ripple that has yet to develop can make all the difference between a hot, sunny day and a dull, wet one.

Figure 3 is a Meteosat 5 infrared image received at 0930 on 11 July and the bright band of cloud marks the frontal position. Three ripples are well defined on this image; one over Britain, one to the southwest of Ireland and another near the Azores. 6 hours later, the Meteosat 5 visible image at 1530 (figure 4) shows the cloud position over England virtually unchanged. Note that the frontal cloud to the south-
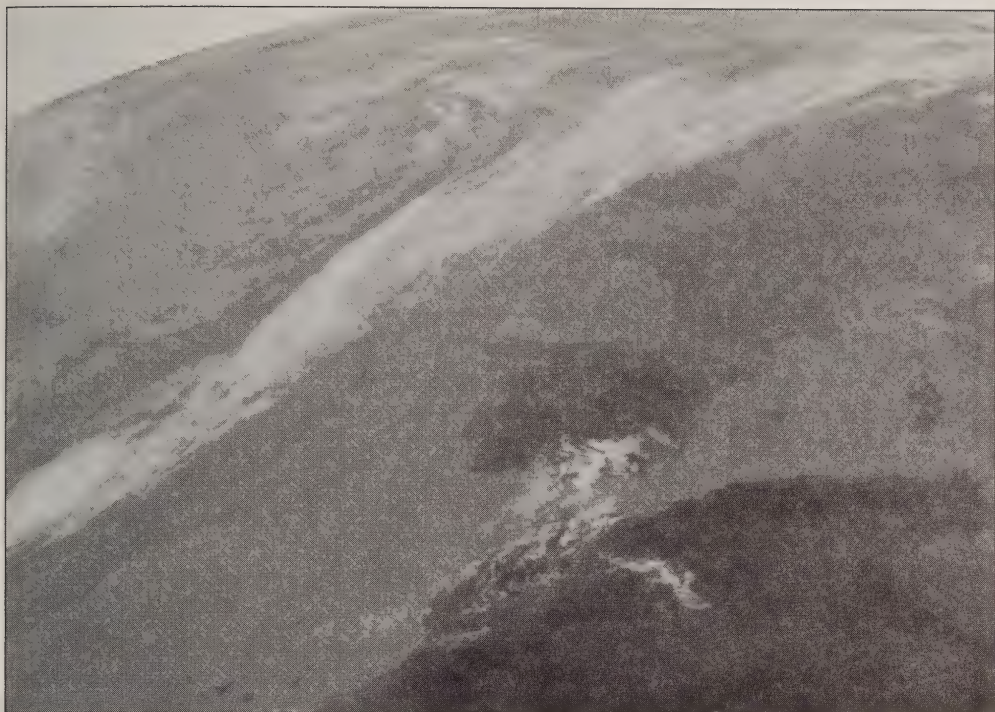
Figure 3

west of the ripple approaching Ireland has largely dissipated. An animated sequence of images over a period of a day or two shows the development and movement of these ripples very well.

Figures 5 and 6 are channel 2 visible images from NOAA12 southbound at 0820 and NOAA 11 northbound at 1540 and show more detail in the frontal structure near the British Isles. Figure 5 shows evidence of some wave motion in the clouds generated by the mountains in Ireland and Wales.

Figure 3 shows no evidence of cloud near Denmark yet the NOAA 12 image (figure 5), which was received only about an hour before, shows pronounced brightness in this region. This is not cloud but sun-glint in the water. The coasts of Denmark and Schleswig Holstein are clearly defined which would be unlikely if the brightness was due to cloud. The Rivers Elbe and Weiser are also reflecting sunlight back to the satellite .

The geometry of sun-glint is quite simple so it is not difficult to predict where and when it will occur. The present weather satellites do not take instantaneous "snap-
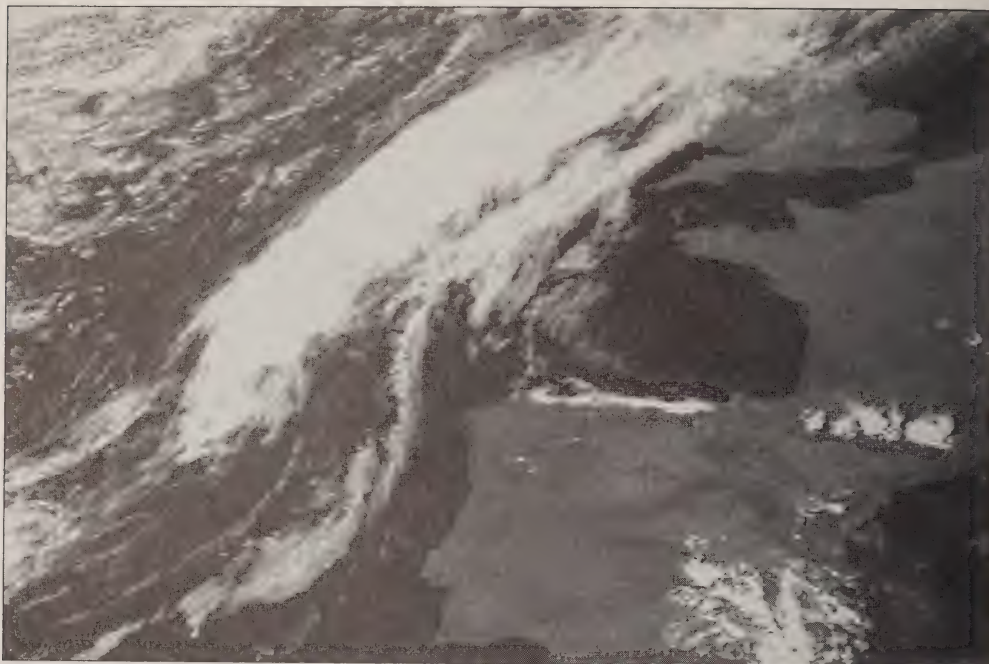
Figure 4
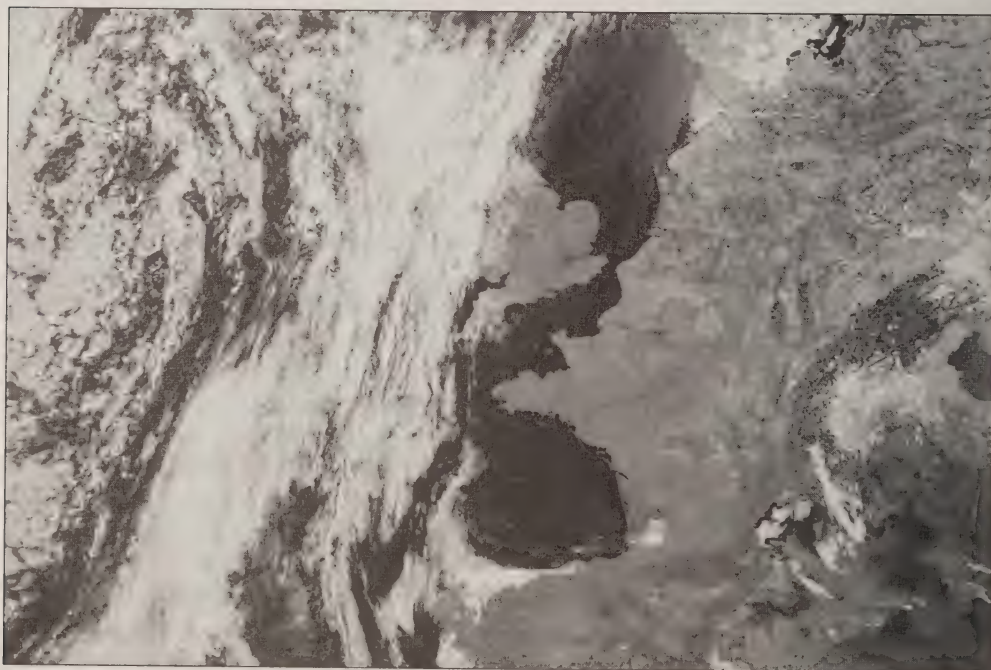
Figure 5

Figure 6

shots" of the Earth but scan the surface below line by line to build up an image. In the case of the polar-orbiters the spacecraft's orbital motion separates the scan lines. The scan is at right angles to the direction of travel of the satellite (which is not quite the same as the satellite's ground track because the Earth is rotating) so it follows that the azimuth of the sun must also differ by 90 degrees from the satellite's heading if it's reflection in water is to appear on the image. Of course, an area of water is seldom mirror-like over any sizeable area so some reflection may be evident when the sun's azimuth is within a few degrees of 90. The appearance of sun-glint in an image can give some indication of sea surface conditions. Note the brightness variations in the western Mediterranean in figure 5. There is very little cloud here and the variations in grey are largely due to varying sea surface roughness.

My prediction programme showed the path of NOAA 10 to be passing down the North Sea close to the Greenwich meridian at 0818 on 11 July on a heading of 196 degrees. Now the direction of scan is parallel to the top of the image so when the imager scanned the island of Fyn (in the bright area off the Danish mainland) it

must have been passing abeam Aberdeen on the east coast of Scotland at about 57.5N. At this latitude NOAA 10's longitude was 0.4E and entering these co-ordinates into InstanTrack and changing the clock to the appropriate date and time the position of the sun at the time of the image was found to be 106 degrees azimuth and 36 degrees elevation. This is exactly 90 degrees from the 196 degree heading of the spacecraft. So far, so good but if Fyn was near the theoretical point for sunglint then the elevation of the sun at Fyn at that time should have been the same as the maximum elevation of NOAA 10 on it's travels down the North Sea. InstanTrack came up with the following values: Elevation of sun 43 degrees, elevation of NOAA 10 45 degrees. The small difference shows that maximum sun-glint should have been at a point just to the east of Fyn.

When NOAA 10 crosses the equator its heading must equal 90 +/- the inclination of its orbit to the equator depending whether it is south or northbound. At the apices of its orbit it must be travelling due west so only on a fairly small part of each orbit is the geometry likely to be right for sun-glint to occur. With the NOAA satellites in their present planes it is predominantly a summer event at north temperate latitudes. The roughness of the sea usually means that sun-glint can be seen over at least a 10 degree range of latitude and often much more. I recall a Meteor image received on Ascension Island showing pronounced sun-glint down the full length of a 20 minute pass.

Readers who were receiving images from NOAA 11 after it was launched may recall that it did not show sun-glint - not at European latitudes anyway. That was because it passed over much nearer to local noon than it does now and the sun was higher in the sky. I dimly recollect playing around with pins, prisms, bowls of water and Greek letters in a school physics lab learning about refractive indices at different surfaces. When the sun is above a critical angle of elevation its light is mostly refracted down in to the water and not reflected from it. Good thing too, or the sea would not warm up in the summer and Meteosat would be blinded at the equinoxes.

Figure 6 shows a northbound NOAA 11 channel 2 pass at 1540 which is close to the time of the Meteosat image at figure 5. Compare the area around the southwest of England and the Bay of Biscay in the two images. NOAA 11's track took it across Corsica and Holland and the sun was in the west-southwest at 90 degrees to the satellite's path resulting in an extensive area of sun-glint. Note also in these images the massive build-up of convective cloud over the Pyrenees Mountains since the morning images.

Finally, the answer to the puzzle I left you with last time. I could have offered a prize for the first correct answer received because of the 22 responses none was

correct! Almost all answers were around 9km for the height of the aircraft but I was looking for about 13km. Only one respondent took parallax into account. The satellite was over 300km to the west at the time and not above the contrail. Had it passed overhead the trail and its shadow would have appeared about 21km apart. The orientation of the contrail was about 140/320 and the sun was in azimuth 095 so although the trail and its shadow appeared to be separated by 24km the aircraft and its shadow were about 21/cos45km apart. Multiplying by tan 23 degrees gives a height of 12.6km or about 41,000ft. The aircraft had probably crossed the Atlantic overnight and burned much of its fuel so this height looks realistic. Thanks to all those who wrote in with answers. It is nice to know that at least 22 people read the article through to the last paragraph. ⊛

USER REGISTRATION AND PAGER INTERFERENCE
John Tellick

RIG met with representatives of the Radiocommunications Agency (RA) in London in May to discuss the registration issue and interference from pager transmitters. A long statement setting out the RA's position arrived too late for inclusion in this issue and has been held over until RIG 39. Briefly, I can say that RIG has been unable to obtain registration for either the Group or individual members. The RA only recognises official users of the 137-138MHz band for registration and, in the eyes of the RA, the Met. Office is the only official user. Although the RA accepts that some RIG members are experiencing pager interference they can only take action if a registered user complains.

Following my failure to obtain from the RA a specification for weather satellite receivers, (it appears that there isn't one) the RA offered "to undertake a small project on performance and protection requirements of weather satellite receivers" at their Radio Technology and Compatibility Group Laboratory. Rig will supply receivers from Martelec, Dartcom, Timestep and perhaps others, in order to investigate any possible way forward to enable us to co-exist with paging transmitters. The pager network is not going to move frequency and the interference may well increase as allocated but, as yet, non-operational channels come into use. It is hoped that this project will take place in August. ⊛

Sub-standard envelopes

Recently, some Journals failed to reach their destination due to poor quality envelopes. Those most affected were new members to whom RIG 36 and RIG 37 were dispatched together. Any members who have not received 36 and 37 should contact the Editor. ⊛

APT DECODER INTERFACE SUITABLE FOR JVFAX
Mark Pepper

Introduction

The last year's RIG Journals have seen articles covering the construction and use of all the component blocks needed to make a computer based weather satellite receiving station. All components that is except the APT decoder, which is the circuitry that takes the audio signal derived from the satellite and converts it into digital information. RIG 35 contained Ray Godden's article on a low cost 137MHz receiver and my article on DIY picture reception which included details of how to connect up a suitable decoder to your serial port and its subsequent use with JVFAX. RIG 37 saw a number of articles on antenna construction and the description and use of JVFAX has been covered in some depth in every issue since RIG 33. This article is intended to help fill the gap with the description and brief construction details of an APT decoder interface capable of producing 256 grey levels. It is not intended for the novice constructor because, although quite straight forward, both an understanding of the principles involved and willingness to modify and redesign as needed is expected. For those not prepared to undertake the construction, the interface will be available as a fully constructed and aligned unit from Pixel Plus developments of Nuneaton. Pixel Plus have also agreed to supply unpopulated PCBs on request.
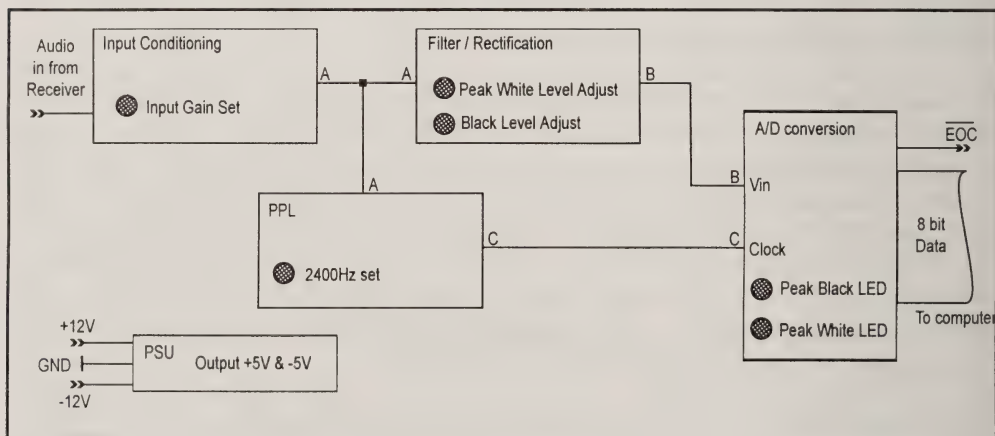
Figure 1

Principles of operation

The image data collected by the NOAA, Meteor and Meteosat satellites are, after some processing, used to amplitude modulate (AM) a 2.4KHz tone. The resulting

signal is then used to frequency modulate (FM) a carrier at around 137.5MHz in the case of NOAA and Meteor satellites or around 1.695GHz for Meteosat. This signal is then radiated and intercepted by our antennas and fed to our receivers. The receivers separate the AM modulated 2.4KHz signal from the carrier and make it available at their audio-out sockets. A decoder takes this audible signal and after some simple filtering and rectification converts it into a signal suitable for a computer to read and display.

Figure 1 shows how the functional units of the decoder are connected and helps give a good overview of what is happening. The audio signal is first amplified in the input conditioning stage (figure 2), the amplifier gain being adjustable with P51 over sufficient range to make the input suitable for connection to the output of almost any receiver. The output from this pre-conditioning stage feeds both the phased locked loop (PPL) and the filter/rectification stages.
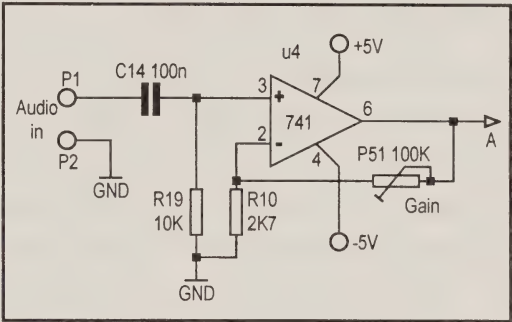
Figure 2

In the filter/rectification stage (figure 3) the signal is cleaned up and the image data recovered from the 2.4KHz carrier. U1A forms a bandpass filter with a response from 500Hz to 3.8KHz. U1B and U1C form an AM demodulator, extracting the data modulated onto the 2.4KHz subcarrier and U1D forms a lowpass filter removing any remaining subcarrier. Image data leaves this stage in the form of a
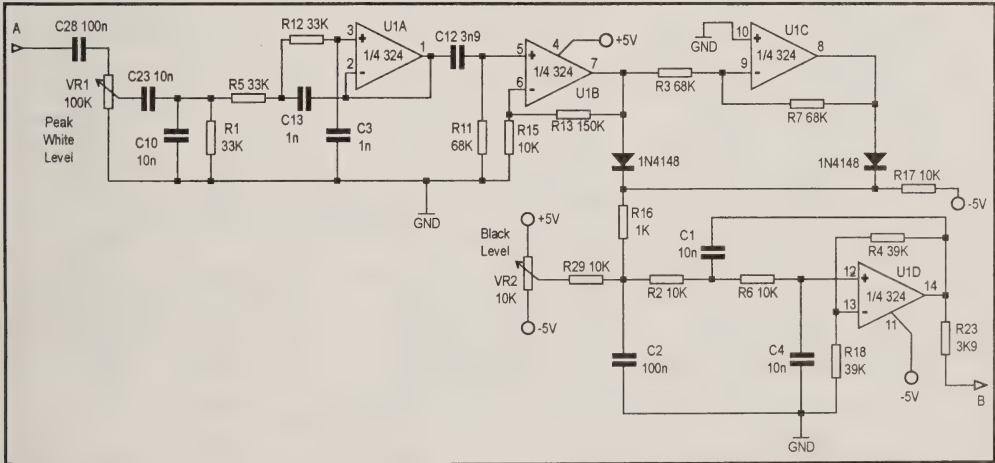
Figure 3

varying voltage, the value of which represents pixel shades within the image being received. VR1 controls the peak-white level (master gain) and VR2 sets the black level of the output signal. Adjustment of these two controls enables the image data signal to be fitted into the input voltage range of the following A/D converter.

Figure 4

The audio signal from the input conditioning stage is also fed into the PPL (figure 4). This 'locks' onto the 2.4KHz audio subcarrier and provides a synchronised clock to the following analogue to digital (A/D) converter stage. By locking the A/D converter to the 2.4KHz subcarrier the system can tolerate reasonable carrier frequency variations caused by Doppler shift resulting from the satellite's movement relative to the receiver. The PPL is pre-set to produce a 2.4KHz clock to the A/D converter by adjustment of P52, allowing the decoder and software to 'free wheel' when no satellite signal is available.

Figure 5 shows the A/D conversion stage. The image data presented to the Vin pin of the converter is sampled and converted to a byte of data suitable for a computer
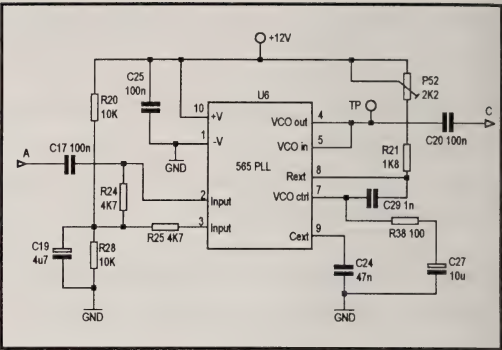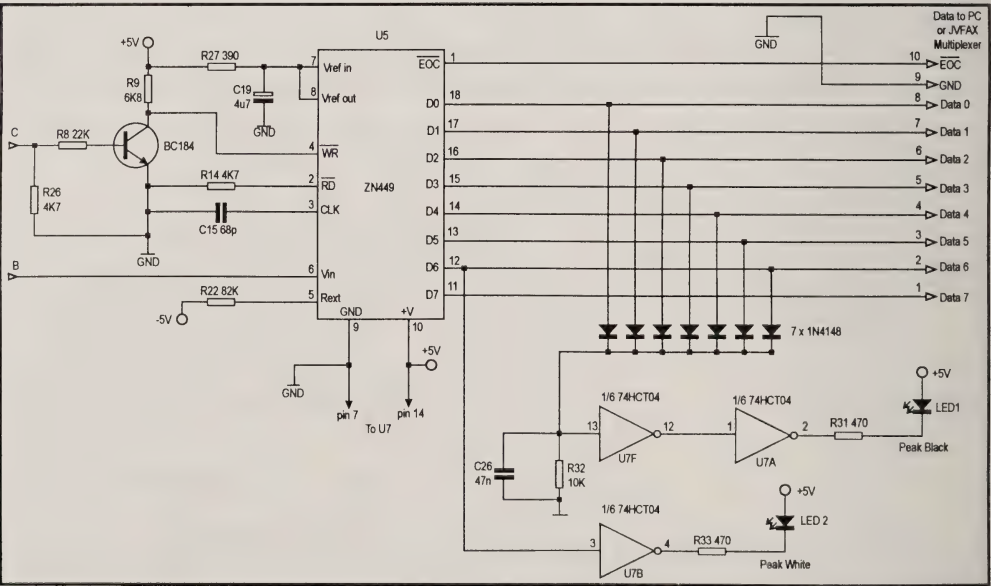
Figure 5

TIME OF ACQUISITION OF SIGNAL   -   52.5 DEG NORTH   0 DEG EAST

10/09	09.49	19.40	13/10	09.25	19.15	15/11	09.00	20.32
11/09	09.36	19.27	14/10	09.11	20.44	16/11	10.29	20.19
12/09	09.23	19.14	15/10	08.58	20.31	17/11	10.15	20.06
13/09	09.10	20.43	16/10	10.27	20.18	18/11	10.02	19.53
14/09	08.57	20.29	17/10	10.14	20.05	19/11	09.49	19.40
15/09	08.44	20.16	18/10	10.01	19.52	20/11	09.36	19.27
16/09	10.13	20.03	19/10	09.48	19.39	21/11	09.23	20.56
17/09	09.59	19.50	20/10	09.35	19.25	22/11	09.10	20.43
18/09	09.46	19.37	21/10	09.22	20.54	23/11	08.57	20.29
19/09	09.33	19.24	22/10	09.09	20.41	24/11	10.26	20.16
20/09	09.20	19.11	23/10	08.55	20.28	25/11	10.13	20.03
21/09	09.07	20.40	24/10	10.24	20.15	26/11	09.59	19.50
22/09	08.54	20.27	25/10	10.11	20.02	27/11	09.46	19.37
23/09	10.23	20.14	26/10	09.58	19.49	28/11	09.33	19.24
24/09	10.10	20.00	27/10	09.45	19.36	29/11	09.20	20.53
25/09	09.57	19.47	28/10	09.32	19.23	30/11	09.07	20.40
26/09	09.43	19.34	29/10	09.19	20.51	01/12	08.54	20.27
27/09	09.30	19.21	30/10	09.06	20.38	02/12	10.23	20.13
28/09	09.17	20.50	31/10	08.53	20.25	03/12	10.10	20.00
29/09	09.04	20.37	01/11	10.21	20.12	04/12	09.56	19.47
30/09	08.51	20.24	02/11	10.08	19.59	05/12	09.43	19.34
01/10	10.20	20.11	03/11	09.55	19.46	06/12	09.30	19.21
02/10	10.07	19.58	04/11	09.42	19.33	07/12	09.17	20.50
03/10	09.54	19.44	05/11	09.29	19.20	08/12	09.04	20.37
04/10	09.41	19.31	06/11	09.16	20.48	09/12	10.33	20.24
05/10	09.27	19.18	07/11	09.03	20.35	10/12	10.20	20.10
06/10	09.14	20.47	08/11	08.50	20.22	11/12	10.07	19.57
07/10	09.01	20.34	09/11	10.18	20.09	12/12	09.54	19.44
08/10	08.48	20.21	10/11	10.05	19.56	13/12	09.40	19.31
09/10	10.17	20.08	11/11	09.52	19.43	14/12	09.27	21.00
10/10	10.04	19.55	12/11	09.39	19.30	15/12	09.14	20.47
11/10	09.51	19.41	13/11	09.26	19.17	16/12	09.01	20.34
12/10	09.38	19.28	14/11	09.13	20.46	17/12	10.30	20.21

MORNING PASSES ARE SOUTHBOUND   EVENING PASSES ARE NORTHBOUND

TIME OF ACQUISITION OF SIGNAL   -   52.5 DEG NORTH   0 DEG EAST

10/09	06.49	16.35	13/10	06.54	16.40	15/11	06.59	16.45
11/09	06.25	17.52	14/10	06.30	16.16	16/11	06.34	16.20
12/09	06.00	17.27	15/10	06.05	17.32	17/11	06.10	17.37
13/09	07.17	17.03	16/10	05.41	17.08	18/11	05.46	17.13
14/09	06.53	16.39	17/10	06.58	16.44	19/11	07.02	16.49
15/09	06.28	16.14	18/10	06.33	16.19	20/11	06.38	16.24
16/09	06.04	17.31	19/10	06.09	17.36	21/11	06.14	17.41
17/09	05.40	17.07	20/10	05.44	17.12	22/11	05.49	17.17
18/09	06.56	16.42	21/10	07.01	16.47	23/11	07.06	16.52
19/09	06.32	16.18	22/10	06.37	16.23	24/11	06.42	16.28
20/09	06.08	17.35	23/10	06.13	17.40	25/11	06.17	17.45
21/09	05.43	17.10	24/10	05.48	17.15	26/11	05.53	17.20
22/09	07.00	16.46	25/10	07.05	16.51	27/11	07.10	16.56
23/09	06.36	16.22	26/10	06.41	16.27	28/11	06.45	16.31
24/09	06.11	17.38	27/10	06.16	17.43	29/11	06.21	17.48
25/09	05.47	17.14	28/10	05.52	17.19	30/11	05.57	17.24
26/09	07.04	16.50	29/10	07.09	16.55	01/12	07.13	16.59
27/09	06.39	16.25	30/10	06.44	16.30	02/12	06.49	16.35
28/09	06.15	17.42	31/10	06.20	17.47	03/12	06.25	16.11
29/09	05.51	17.18	01/11	05.55	17.23	04/12	06.00	17.27
30/09	07.07	16.53	02/11	07.12	16.58	05/12	05.36	17.03
01/10	06.43	16.29	03/11	06.48	16.34	06/12	06.53	16.39
02/10	06.19	17.46	04/11	06.23	16.10	07/12	06.28	16.14
03/10	05.54	17.21	05/11	05.59	17.26	08/12	06.04	17.31
04/10	07.11	16.57	06/11	07.16	17.02	09/12	05.40	17.07
05/10	06.47	16.33	07/11	06.51	16.38	10/12	06.56	16.42
06/10	06.22	17.49	08/11	06.27	16.13	11/12	06.32	16.18
07/10	05.58	17.25	09/11	06.03	17.30	12/12	06.08	17.35
08/10	07.15	17.01	10/11	05.38	17.06	13/12	05.43	17.10
09/10	06.50	16.36	11/11	06.55	16.41	14/12	07.00	16.46
10/10	06.26	16.12	12/11	06.31	16.17	15/12	06.36	16.22
11/10	06.02	17.29	13/11	06.06	17.34	16/12	06.11	17.38
12/10	05.37	17.04	14/11	05.42	17.09	17/12	05.47	17.14

MORNING PASSES ARE SOUTHBOUND   EVENING PASSES ARE NORTHBOUND

TIME OF ACQUISITION OF SIGNAL   -   52.5 DEG NORTH   0 DEG EAST

10/09	04.54	16.27	13/10	04.50	16.23	15/11	06.28	16.19
11/09	04.42	16.15	14/10	06.20	16.11	16/11	06.16	16.07
12/09	06.11	16.02	15/10	06.07	15.58	17/11	06.03	15.54
13/09	05.59	15.50	16/10	05.55	15.46	18/11	05.51	15.42
14/09	05.46	15.37	17/10	05.42	15.33	19/11	05.38	15.29
15/09	05.34	15.25	18/10	05.30	15.21	20/11	05.26	16.59
16/09	05.21	15.12	19/10	05.18	16.50	21/11	05.13	16.46
17/09	05.09	16.42	20/10	05.05	16.38	22/11	05.01	16.34
18/09	04.57	16.30	21/10	04.53	16.26	23/11	06.30	16.21
19/09	04.44	16.17	22/10	06.22	16.13	24/11	06.18	16.09
20/09	06.14	16.05	23/10	06.10	16.01	25/11	06.05	15.56
21/09	06.01	15.52	24/10	05.57	15.48	26/11	05.53	15.44
22/09	05.49	15.40	25/10	05.45	15.36	27/11	05.40	15.31
23/09	05.36	15.27	26/10	05.32	15.23	28/11	05.28	17.01
24/09	05.24	15.15	27/10	05.20	16.53	29/11	05.15	16.48
25/09	05.11	16.44	28/10	05.07	16.40	30/11	05.03	16.36
26/09	04.59	16.32	29/10	04.55	16.28	01/12	06.32	16.23
27/09	04.46	16.19	30/10	06.24	16.15	02/12	06.20	16.11
28/09	06.16	16.07	31/10	06.12	16.03	03/12	06.07	15.58
29/09	06.03	15.54	01/11	05.59	15.50	04/12	05.55	15.46
30/09	05.51	15.42	02/11	05.47	15.38	05/12	05.42	15.33
01/10	05.38	15.29	03/11	05.34	15.25	06/12	05.30	15.21
02/10	05.26	15.17	04/11	05.22	16.55	07/12	05.17	16.50
03/10	05.13	16.46	05/11	05.09	16.42	08/12	05.05	16.38
04/10	05.01	16.34	06/11	04.57	16.30	09/12	06.34	16.25
05/10	04.48	16.21	07/11	06.26	16.17	10/12	06.22	16.13
06/10	06.18	16.09	08/11	06.14	16.05	11/12	06.09	16.00
07/10	06.05	15.56	09/11	06.01	15.52	12/12	05.57	15.48
08/10	05.53	15.44	10/11	05.49	15.40	13/12	05.45	15.35
09/10	05.40	15.31	11/11	05.36	15.27	14/12	05.32	15.23
10/10	05.28	15.19	12/11	05.24	16.57	15/12	05.20	16.52
11/10	05.15	16.48	13/11	05.11	16.44	16/12	05.07	16.40
12/10	05.03	16.36	14/11	04.59	16.32	17/12	06.36	16.27

MORNING PASSES ARE SOUTHBOUND   EVENING PASSES ARE NORTHBOUND

TIME OF ACQUISITION OF SIGNAL   -   52.5 DEG NORTH   0 DEG EAST

10/09	07.51	17.38	13/10	07.37	19.05	15/11	07.22	18.50
11/09	07.29	18.58	14/10	07.15	18.43	16/11	07.00	18.28
12/09	07.07	18.36	15/10	08.34	18.21	17/11	08.19	18.07
13/09	08.27	18.14	16/10	08.12	17.59	18/11	07.58	17.45
14/09	08.05	17.52	17/10	07.50	17.37	19/11	07.36	19.04
15/09	07.43	17.30	18/10	07.28	18.57	20/11	07.14	18.42
16/09	07.21	18.49	19/10	07.07	18.35	21/11	08.33	18.20
17/09	06.59	18.28	20/10	08.26	18.13	22/11	08.11	17.58
18/09	08.19	18.06	21/10	08.04	17.51	23/11	07.49	17.36
19/09	07.57	17.44	22/10	07.42	17.29	24/11	07.27	18.56
20/09	07.35	19.03	23/10	07.20	18.48	25/11	07.05	18.34
21/09	07.13	18.41	24/10	06.58	18.27	26/11	08.25	18.12
22/09	08.32	18.19	25/10	08.18	18.05	27/11	08.03	17.50
23/09	08.10	17.57	26/10	07.56	17.43	28/11	07.41	17.28
24/09	07.48	17.35	27/10	07.34	19.02	29/11	07.19	18.47
25/09	07.26	18.55	28/10	07.12	18.40	30/11	06.57	18.25
26/09	07.04	18.33	29/10	08.31	18.18	01/12	08.16	18.03
27/09	08.24	18.11	30/10	08.09	17.56	02/12	07.54	17.41
28/09	08.02	17.49	31/10	07.47	17.34	03/12	07.32	19.01
29/09	07.40	19.08	01/11	07.25	18.54	04/12	07.10	18.39
30/09	07.18	18.46	02/11	07.03	18.32	05/12	08.30	18.17
01/10	08.37	18.24	03/11	08.23	18.10	06/12	08.08	17.55
02/10	08.15	18.03	04/11	08.01	17.48	07/12	07.46	17.33
03/10	07.54	17.41	05/11	07.39	19.07	08/12	07.24	18.52
04/10	07.32	19.00	06/11	07.17	18.45	09/12	07.02	18.30
05/10	07.10	18.38	07/11	08.36	18.23	10/12	08.21	18.08
06/10	08.29	18.16	08/11	08.14	18.01	11/12	07.59	17.46
07/10	08.07	17.54	09/11	07.52	17.39	12/12	07.37	19.06
08/10	07.45	17.32	10/11	07.30	18.59	13/12	07.15	18.44
09/10	07.23	18.52	11/11	07.09	18.37	14/12	08.35	18.22
10/10	07.01	18.30	12/11	08.28	18.15	15/12	08.13	18.00
11/10	08.21	18.08	13/11	08.06	17.53	16/12	07.51	17.38
12/10	07.59	17.46	14/11	07.44	17.31	17/12	07.29	18.57

MORNING PASSES ARE SOUTHBOUND   EVENING PASSES ARE NORTHBOUND

to read. The point at which sampling is done is controlled by the locked 2.4KHz signal output from the PLL stage. The 8 bits of data can be fed directly into the JVFAX multiplexer interface described in my RIG 35 article (page 42, fig 2) and thus read and displayed by JVFAX. The Pixel Plus PCB has provision for a simple two LED display system (the assembled decoder has this fitted). This display interface only monitors the lower seven bits of the output signal and so does not give a completely accurate display of the output data status. However, LED2 can be used to give an indication of peak-white and LED1 of peak-black levels which can be useful when setting up the decoder.

Finally, figure 6 shows the power supply section. This supplies both +5V and -5V as well as a +12V supply to the PPL. The user must supply a suitable +/-12V DC supply capable of providing 60mA at +12V and 10mA at -12V. The assembled Pixel Plus decoder contains a small invertor circuit that provides both supplies from a single positive voltage of around 12 to 15V. This is most easily obtained from a small 'power block' type PSU. The figure also shows the unused gates from U7.
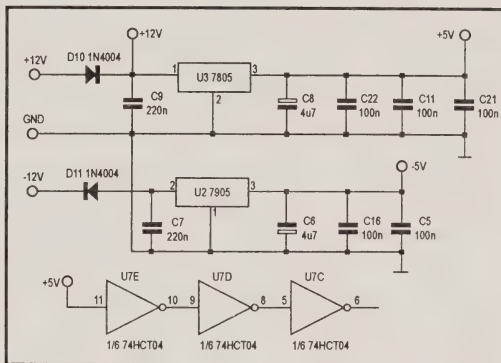
Figure 6

Construction

All the components should be soldered onto the PCB while observing the usual heat and static precautions. First fit all the resistors then the capacitors and presets. Fit the transistors and diodes last. IC sockets should be used for all the integrated circuits. Figures 7 and 8 show the component positioning and PCB track pattern respectively. All external connections can be made either directly to the board or to pins fitted into the appropriate holes. Output from the A/D converter is taken to a 10-way in-line connector and then by cable to the multiplexer circuit described in RIG 35. VR1 and VR2 can be mounted directly to the PCB (if they are PCB mountable types) or to a panel as required.

Setup

Connect the unit to a power supply and an APT signal to the audio input. Set the gain preset (P51) to its mid-position and turn both VR1 (peak-white level) and VR2 (black level) fully anticlockwise. Check that the black level LED (LED1) is on and LED2 (peak-white) is off. If this is not the case try readjusting the gain preset, P52.

With the APT signal still present turn the black-level control clockwise until the black-level LED goes out. Now turn the control back again until the LED just comes back on again. Next turn the peak-white control clockwise until the peak-white LED starts to flicker. The black-level LED will also start to flicker. If this procedure proves dificult try readjusting the input gain preset before adjusting the black and white levels again.

Operation

The decoder is suitable for use with APT signals transmitted by the polar-orbiting satellites (NOAA & Meteor) and the geostationary satellites (Meteosat & GOES). A suitable receiving system is required, the output from which is applied to the audio input of the decoder. In the case of JVFAX the output from the decoder should first be connected to the multiplexer circuitry described in my article in RIG 35 (fig 2) and the multiplexer connected to an IBM PC via its serial port. Apart from setting the correct serial port address, 'serial' mode should be selected from the configuration menu. All other settings can be left at their default values. When a signal is being received and decoded correctly the two LEDs on the decoder should flicker in time to the received audio signal and a spread of peaks across JVFAX's FAX histogram display should be seen. JVFAX modes 2, 3, 6, 7, 8, 9, 17 and 19 are preset for APT signals. Further details regarding JVFAX can be found in the comprehensive user's manual supplied in computer format along with the JVFAX program and in a document entitled "Shareware RTTY/FAX Decoding Programs for the IBM PC" written by Dave Moisan. This document is available on the RIG BBS as RTTY_FAX.ZIP.

Using the decoder with other computer platforms should not present too many problems. Essentially you need two things; firstly a FAX program capable of reading 8-bit data from a specified 8-bit input port and secondly, and perhaps obviously, an 8-bit parallel input port. Both synchronous and asynchronous input of the data can be accommodated, the synchronisation for a synchronous mode being derived from the EOC line from the A/D converter. It should be noted that although the data from the APT signal are converted to a digital form synchronously by this decoder, data transfer to the computer system will generally occur asynchronously. This is the case with JVFAX and the referenced multiplexer.

Information Sources

JVFAX Documentation, Eberhard Backeshoff.
Pixel Plus Developments, Nailstone, Nuneaton, Warks. CV13 0PZ.
Tel 0530 262565. ⊛
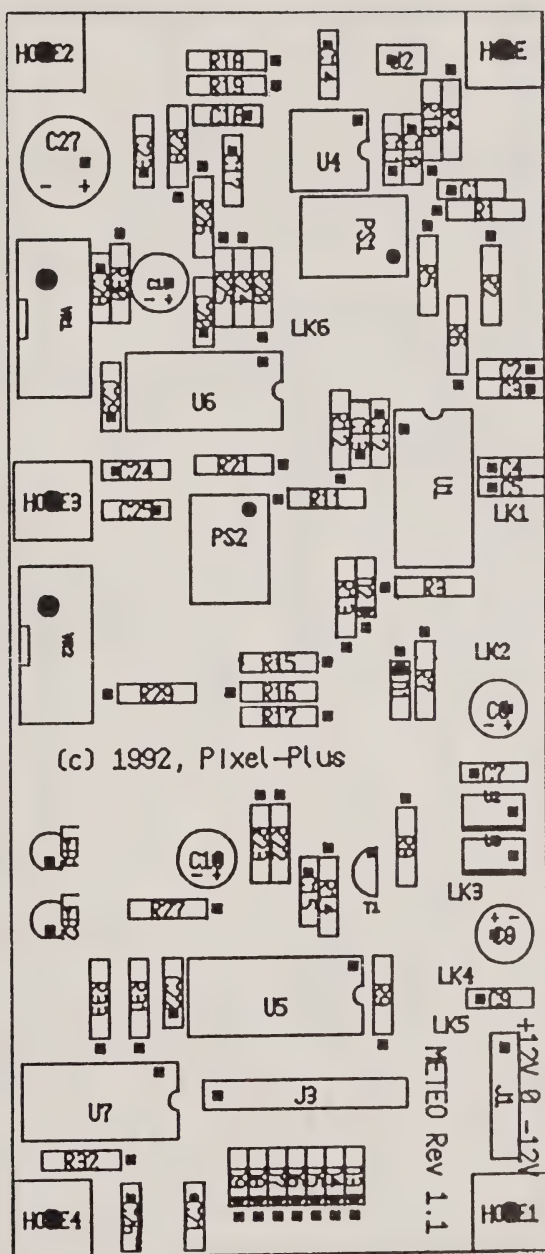
Figure 7. PCB Component side

©1992, Pixel Plus
Ref RIG 38
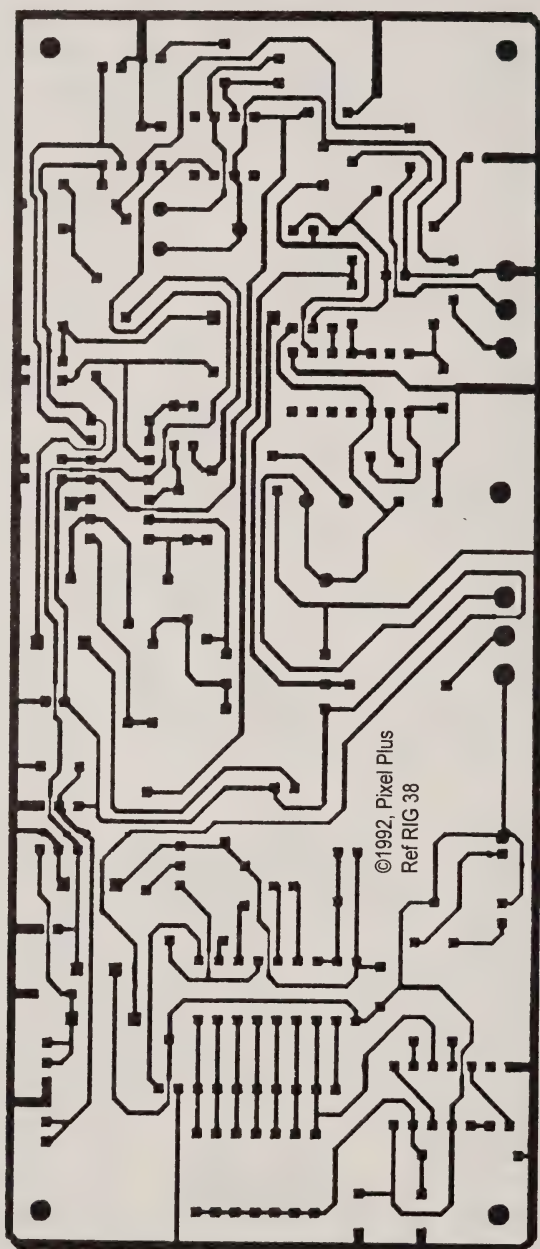
Figure 8. PCB Solder side

COMPUTER-GENERATED NOISE AND RADIO RECEPTION
Tom Woolner

General Remarks

These notes are intended as a guide for self-help purposes only. Each case will be different and the ideas discussed here derive from my own experience, based on about three years of receiving both polar-orbiter weather satellites and fax broadcasts using computers.

Safety - if you are not sure - DON'T. As with anything electrical where mains or high voltages are concerned - BE CAREFUL. Some ideas discussed here call for mains filters. You should only use the fully enclosed, purpose-built sort and house it in a safe, metal box. I do not recommend trying to build your own filters for reasons of both safety and results. I make no appology for stressing safety here.

There is, in my experience, no one magic cure for the problem of computer-generated noise. Many small refinements, each of which produces only a small difference of itself, will combine to make a big improvement. Looked at from point of view of extending the effective horizon of Meteor satellites, these measures extended my horizon from southern Greenland to beyond its northern coast in the north, and from the Algerian coast to well into the Sahara desert in the south. (My location is 40 kilometres north of London) After reading this I hope you will be able to think of other schemes for noise reduction.

Cases and Cables

Noise generated inside a computer or monitor case is best kept there. A metal case is essential. All the case screws should be well tightened. New computers have to conform to high standards of radiation emission control, so the lucky people with new kit are already well ahead. Old machines didn't have to comply with strict standards so the humble Amstrad, for example, with its plastic case is really not suitable for imaging.

Reducing noise emission from the computer and monitor is well worth the effort. If you are unfortunate and have an old noisy system some radical solutions are called for. However I recently read a dangerous article describing how to line a monitor case with cooking foil. For a reputable monthly dealing with amateur electronics, this article was shocking. Metal cases for all system components are important but unless you really do know what you are doing, don't open the box - it could be a quick way to find yourself in another kind of box.

Consider the many possible paths from computer bench (main chassis, monitor, keyboard, mouse, printer and any other attachments) into the receiver front-end. Some of these offer direct wire conduction into the receiver case, radiation from equipment cabling to the antenna outside, RF leakage through coax braiding of the antenna cable inside the room and - my own real difficulty - conduction of VHF currents over the exterior of the coax cable out to the antenna itself. Don't over-look radiation through brickwork and slates or tiles. The effects of this will vary with wetness and materials, and therefore with the weather.

Minimise the number of leads plugged into the computer. Unplug any devices not actually used for picture capture, e.g. the mouse, the printer; switch off the printer. External tape or disk drives can be very noisy. A CD ROM drive I know of swamps any receiver within about 6 metres of it.

Grounding

Ground the exterior of the case by a short, non-inductive strap. My situation allows direct grounding. A wide, but thin, brass strip, attached to one of the computer case screws, passes over the back of the bench, out through the jamb of a disused door straight to a brass stake driven into the soil of the flower bed outside - a distance of about 2 metres. This measure is most effective in reducing noise from about 20 MHz downwards. There is little improvement at VHF.

Ferrite Traps

All leads to essential external devices should pass through ferrite traps. Mains leads on some equipment come fitted with ferrite traps sealed in place with heat-shrink sleeving or a molded plastic block. Sometimes you can buy ferrite tubing, big enough to slide over mains cable, at radio rallies and surplus stock sales. Grab it when you see it - it is wonderfully useful. If you cannot find lengths of tubing, use three or four small toroids packed close together.

To make your own trap take off the mains plug, slip on a 2 inch length of ferrite tube up to about 10 cm from the computer connector - the cable must be free to bend where it leaves the connector. Wrap the ferrite in PVC tape to hold it in position and to cushion it from accidental knocks. Refit the mains plug and you have your own ferrite trap mains lead. Make as many leads as you can for your entire system. Every entry or exit from any digital equipment should be considered suspect.

Effective though the ferrite trap method is, further improvement comes from using a filter mains socket mounted in a box. Standard IEC mains connectors with in-built filters cost about £4 now. Fit one of these in a die-cast box with a lead and plug for the wall power outlet. Make sure the mains ground wire is well connected to the inside of the box. Ground the outside of the box to the same external ground as described above. Power all your computer system through this filter unit. This device seems to prevent the house wiring radiating noise at low level.

Keyboard cables, mouse leads and most importantly the receiver audio lead into the decoding device should all be fitted with ferrite traps. A 50 mm i/d toroid is suitable here. Use one for each cable. You cannot normally get to a free end of the cable of these devices without invalidating your warranty or service agreement, or causing a lot of tedious rewiring, so the toroid must be large enough to pass the plug through the hole 4 or 5 times. Wind the cable tightly for 4 or 5 close turns and tie the ends to the toroid - don't tie entry and exit arms together. The end with the plug on it should be about 50 mm from the computer case.

Antennas and Co-axial Cable

The usual "turnstile" antennas have a polar response shaped like a flattened sphere in space, with a near horizontal maximum. The sort without ground plane elements have this spherical polar response centred on the elements. This aerial should be mounted as far away from the computer as possible to reduce direct pick-up. Because the response is equally strong downwards as upwards and all around, distance and screening are the only solutions. Try putting a tree or building between the antenna and the computer. Yes, this does conflict with the need for a short antenna lead. A spare bedroom used as a radio shack with the antenna close by on the roof or chimney is not the best arrangement.

The antenna with ground plane elements has its polar response modified. Its base is flattened and entirely above the reflectors, with the maximum response angled upwards by some 10 to 15 degrees, minimising the response to ground or close to ground sources. While this sort is not the best for close to horizon work, it is much better for local noise rejection - and that includes the neighbour's TV timebase noise.

I found that I could affect the apparent noise strength registered by the receiver by simply grasping the antenna cable with my hand, anywhere between the receiver socket and where it goes out through the window frame. This meant that VHF currents were flowing over the outside of the coax braiding, out to the antenna elements. The solution to this was not even more ferrite but a shorted coaxial quarter wave stub, tuned for 137.5 MHz, fitted over a short length of high quality,

close-weave, braid coax. This device presents a very high impedance to currents of the frequency to which it is tuned.

How to Make a Quarter-wave Stub.

You will need a few of yards of high grade coax that matches the impedance of the rest of your system, an in-line TV plug and socket, 53cm of light alloy tubing of 12mm i/d, about a metre of nylon Strimmer filament and a few centimetres of thick, tinned, copper wire. A small rotary pipe cutter is used for trimming the pipe to length.

Construct a short extension lead, long enough to reach outside the building plus about 1 metre. Fit the TV coax plug onto the original cable and the inline socket to the new cable. Make sure the cable braids are well connected to the connector shells and the inner pins are well soldered. These joints will be difficult to correct later so make a good job now. Cut the end of the tube lengthways about 6mm with a large pair of side cutters or a small hack saw, making 8 tabs to bend outwards. Wind the nylon filament around the cable exterior over the length of the cable to be covered by the tube and tape the ends in place. This serves as a spacer and maintains the separation between the coax and the tube.

Push the slotted end of the tube firmly against the back of the inline socket. Bend alternate tabs to closely conform to the socket shell. Fold the other tabs over, ready for the copper wire. Weave the wire about the tabs and over the connector shell. When this is complete solder each crossover point and compress the folded tabs over the wire to form a good mechanical and electrical joint between the tube and socket.

Live trim the lead assembly in situ. Connect the lead assembly with the open end of the stub towards the receiver. Cut off 6mm lengths carefully, one at a time, with the rotary cutter until there is no improvement in noise reduction from the previous trim, then stop cutting. Use side cutters to snip off the trimming rings. Mine finished up at 49cm. If the assembly is to be sited outdoors, seal the connectors with car underseal paint, or similar, and seal the open end of the stub with heatshrink sleeving. A good place to locate the stub is hanging downwards outside the house with the connector end close to the ground and the cable passing through a hole in the window frame.

Materials

Most of the materials mentioned above can be obtained from Cirkit, Maplin, Farnell and others. The ferrite tube is the one item that might prove difficult. I found my bits in a job-lot of ferrites at the Luton & Dunstable rally last year.

Television

This is not really covered by the title but is very closely related. TV antenna cables radiate strongly. An earthing strap connecting the braid to ground outside the window frame is very useful. A mains filter (tucked away behind the set and away from small fingers, please) as described for the computer completes the solution of TV interference problems, but only from your house. As for the neighbours . . . ⊕

NASA AGREES TO LAUNCH S.AFRICAN MICRO-SATELLITE

The U.S. space agency NASA has agreed to launch South Africa's first satellite, SUNSAT, which was developed at Stellenbosch University near Cape Town, in January 1996. A four-member NASA team evaluated the Stellenbosch project and offered the university a free launch in return for minor additions of American equipment. About 40 electronic engineering students, five professors and six lecturers have planned, developed and built the satellite since 1989.

Stellenbosch project leader Garth Milne said the satellite would deliver high-resolution, multi-spectral stereo images of the earth and would carry amateur radio equipment that would be used to stimulate technical interest among schoolchildren. "SUNSAT will bring back high-resolution images of the earth in three colors. It will be able to bring back images from the other side of the earth stored in its memory," he said. The satellite also had a communications system that would enable children to talk to the satellite in space.

The project would have ended, however, without NASA's help because the university could not afford the nearly $400,000 cost of an Ariane launch. NASA was keen to launch SUNSAT because it could carry an American Global Positioning System (GPS) receiver and a laser reflector needed to monitor variations in the earth's gravitational field. The satellite will be controlled from the university during its expected four-year life.

[The above is an abridged version of a Reuters report written by Ingeborg Lichtenberg and passed to me by Marcia Smith. Ed.] ⊕

NASA TELEVISION

NASA TV is carried on the Spacenet 2 satellite located at 69 degrees west and therefore above the horizon for western Europe. It is on transponder 5, channel 9. Transponder frequency is 3880 MHz, audio subcarrier is 6.8 MHz and polarisation is horizontal. The Editor would be interested in reception reports from Europe. ⊕

IMAGES ON INTERNET
Peter Wakelin

By now, few people can be unaware of the existence of Internet or the "Information Superhighway". It is probably the fastest growing network there is and the number of computers linked will probably pass the two million mark before you read this. Mine is now one of them. Many computer magazines have run major features about Internet and several now have a regular column on the subject so there is no point in my going in to technicalities here on how the system operates. Numerous Internet service providers advertise in the magazines too and they offer varying degrees of connection at even more variable prices. What is on Internet for RIG members?

The first thing I discovered on connecting was that there's an awful lot of rubbish out there! Large numbers of "experts" write on subjects they know little about. Recently I read that "...of course the Shuttle astronauts won't see the comet crash onto Jupiter any better than we will down here because the Space Shuttle flies in the troposphere and not above the atmosphere..." and "..the antipode to 5S 105E, which is at 5N 105W..." Good initial sources of information are the mailing lists for specialist groups. A simple subscription request to the server is all that is needed. WXSAT-mail run by Richard Emerson is an obvious starting point for RIG members and I have nothing but praise for it. Within 4 hours of my subscription request the first items were emerging from my modem. It wasn't long before I found addresses for satellite images and was soon downloading HRPT images of Alaska and high resolution images of Australia from GMS-4 and the data were just a few hours old! Up-to-date orbital elements are available too, and not just for weather satellites.

Of course, imagery isn't confined to that from weather satellites. The Space Telescope Science Institute in Baltimore kindly made images of the comet/Jupiter collision from the Hubble Space Telescope available to the Internet community very rapidly, as did several astronomical observatories around the world. Hundreds of thousands of images from the interplanetary probes are also available.

How much does it cost? I use Demon Internet Services and they meet my needs for £10 a month plus VAT and then there is the telephone bill on top of that. I am fortunate in having a Demon point-of-presence at Reading which is just a local call for me. Image files vary greatly in size; many are only one or two hundred kilobytes but some are very big. A full-disk GMS-4 or GOES vis image at 4km resolution in GIF format is nearly 5 megabytes but you can download a "quick-look" lower resolution JPEG first to see if you really want the big one. I allow about 10 minutes a megabyte. Several of the images in this issue were downloaded from the Internet. ⊕

THE SOVIET & CHINESE SCENE
Peter Wakelin

In the three months since I last wrote this column METEORs 3-5 and 2-21 are, as far as I know, the only METEORs to have transmitted images. Apart from a short break in June, Meteor 3-5 has transmitted very good images for several months now. By early September the northbound morning passes will have precessed into the morning twilight but it is possible that transmissions will continue as the southbound, late afternoon passes will be adequately illuminated by then. In the northern hemisphere we have seen some very good imagery this summer and several UK members have been monitoring the ice break-up around Greenland and Baffin Island. I do not recall having seen so much clear water between northern Greenland and the pack-ice in previous summers. Of course, July is mid-winter in the southern hemisphere but there was still plenty of sunshine over Namibia when George Jillings received this image from METEOR 3-5 on 2 July at 1120. There was also plenty of wind over Namibia blowing large quantities of sand out into the South
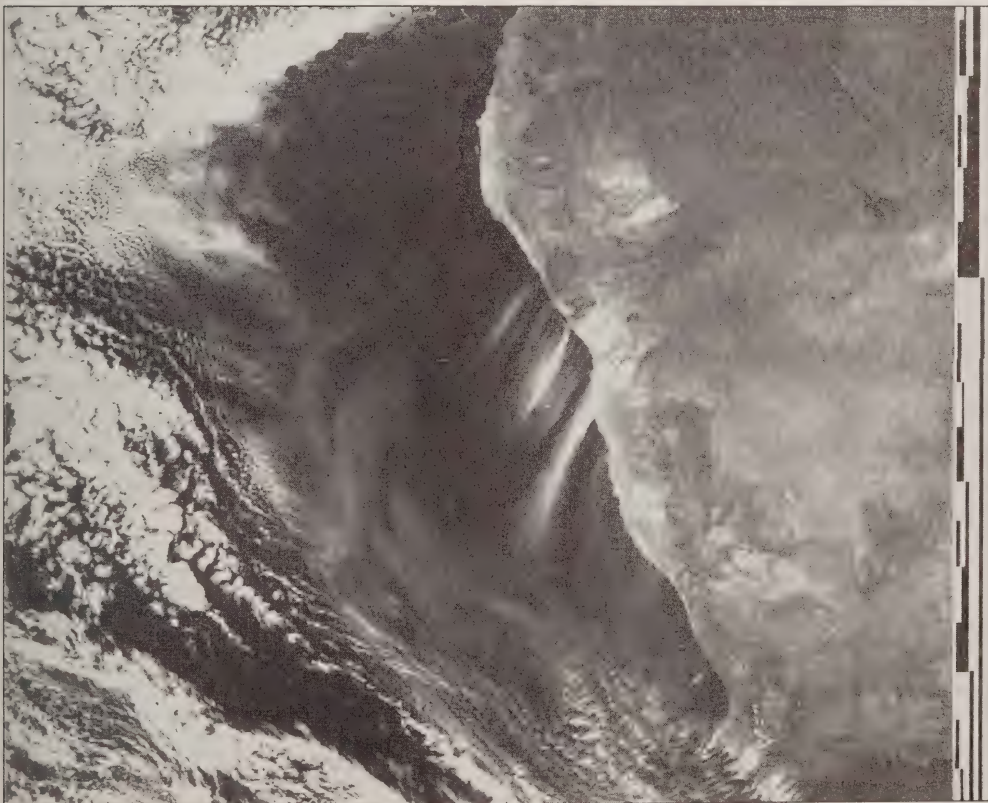
Atlantic.

There seemed to be some confusion over frequencies in the May/June period. 3-5 was on 137.85MHz until it was switched off on 21 May while METEOR 2-21 was transmitting on 137.40 until late May with a mostly weak signal. It changed to 137.85 in late May, possibly to see if the signal was any better on that frequency. Then around 12 June 3-5 came back on 137.85 also. Moscow's prediction bulletin issued on 14 June said 2-21 would be on 137.40 but it remained on 137.85 until switching off a week later. Perhaps the people who prepared the prediction bulletin were not aware that METEOR 2-21 had changed frequency.

I have nothing to report on the Chinese scene this time. I have not heard what effect the explosion will have on the Feng Yun programme. ⊕

QUESTIONS AND ANSWERS

Q. In the Kepler elements I notice that argument of perigee plus mean anomaly is usually, but not always, near to 360. When the sum is not near to 360 are the elements wrong?

A. No. If there was a direct relationship between the two there would be no need to include both in the element set. Briefly, this is what each element does: The size and shape of the ellipse is determined by mean motion and eccentricity. The plane of the orbit in space is fixed with Right Ascension and inclination and the direction of long axis of the ellipse in this plane is governed by the argument of perigee. Mean anomaly fixes the position of the satellite on the ellipse at the epoch of the element set.

The epoch of elements from some sources are computed to coincide with times of northbound equator crossings in which case, provided e is small, mean anomaly plus argument of perigee will be near to 360. If the orbit is precisely circular, then the sum will be exactly 360. If the satellite is not over the equator at epoch time this will not be the case. An article containing a detailed explanation of the elements will appear in the December Journal.

Q. How often should I update my Kepler elements?

A. That depends on how accurate you want your predictions or the grids on your images, how old the elements are when you get them and most importantly, how good the prediction software is. Elements a week old should be good to a few seconds for weather satellites and after a month should still be within a minute.

The predictions in the RIG journals are mostly within 5 minutes after 3 months. Don't forget to check the accuracy of your computer's clock if you use one of those real-time tracking programmes or you want accurate grids on your images.

Q. Is a dish antenna designed for satellite TV suitable for Meteosat reception?

A. The focal length of satellite TV dishes is usually small compared with the diameter. f/D values are typically 0.3. The "coffee-can" type of circular feed-horn typically used for Meteosat reception is most efficient at a focal ratio of around 0.6 but can be designed with a wider angle of illumination. A short-focus dish can be used with a circular feed-horn but signals reaching the edge of the dish may be lost. ⊕

UPDATES ON GOES 8 AND NOAA 14

As reported in RIG 37, GOES 8 was launched in April. Since then it has been stationed above 90 degrees west undergoing thorough testing. The first images have lived up to expectations and show a big improvement over the earlier generation of GOES satellites. Several minor anomalies have been encountered and overcome and operational readiness is near. GOES 8 will be moved to 75 degrees west and take over from Meteosat 3 soon.

The launch of NOAA-J (NOAA 14 when in orbit) has been further delayed. The Air Force pinched the September launch slot because they wanted another DMSP craft in orbit. That delayed launch until 29 November but now a problem has been encountered with the high resolution infrared sounder. The fault is intermittent and proving difficult to correct. A December launch is still possible but if the HIRS has to be replaced with the one on NOAA-K then the launch will slip into 1995. If that happens then the next GOES launch, scheduled for April 1995, will also be delayed as the two craft share the same check-out facilities. ⊕

FOR SALE Panasonic KX-P1124 24-pin dot-matrix printer. Unused £80. Viglen 286 PC, co-processor, ET3000 1Mb video card, DOS 5.0, Stacker v2.0. No monitor. £240. Procomm Plus (for Windows) PC modem software (original with manuals) £35. Dartcom VHF scanning receiver (their PROFESSIONAL model) £295. Timestep PROsatII card with latest software £75, Track II tracking software £37. Genoa 7900 1mb 24-bit ISA graphics card £65. All items plus p/p. Tel Paul G4XHF 0622 696437 (day) or 0293 515201 (evenings).

KEPLER ELEMENTS

```
NOAA9
1 15427U          94213.89489788    .00000118                        8994
2 15427   99.0453 264.9137  0015918 90.2324    270.0673 14.13632665496716
NOAA10
1 16969U          94214.01142438    .00000022                        7959
2 16969   98.5083 221.6149  0012770 191.8559   168.2322 14.24900307409025
NOAA11
1 19531U          94213.95604233    .00000056                        7170
2 19531   99.1749 203.9953  0012287 9.0137     351.1255 14.13006797301601
NOAA12
1 21263U          94213.98687241    .00000100                        1219
2 21263   98.6143 240.7507  0013833 101.9611   258.3121 14.22434102167019
METEOR 3-3
1 20305U          94214.17625310    .00000044         .              1046
2 20305   82.5481 238.1872  0007056 169.8258   190.2976 13.04423821228899
METEOR 3-4
1 21232U          94213.31479971    .00000051                        7205
2 21232   82.5437 137.6981  0014536 72.5269    287.7438 13.16463399157294
METEOR 3-5
1 21655U          94212.12554100    .00000051                        7286
2 21655   82.5547 85.7220   0014700 83.6923    276.5866 13.16833267142242
METEOR 3-6
1 22969U          94212.53750014    .00000051                         842
2 22969   82.5559 24.9591   0015685 149.8710   210.3310 13.16723518 24686
METEOR 2-21
1 22782U          94213.36733443    .00000042                        3226
2 22782   82.5485 170.6331  0023958 97.1572    263.2315 13.83011259 46335
```

Frequencies: NOAAs 9/11 137.62MHz, NOAAs 10/12 137.50MHz
                METEORs 137.30, 137.40 or 137.85MHz

Explanation of elements format above:

Line 1: NORAD catalogue number, Epoch, Decay rate (NDOT/2), Bulletin number (thousands omitted), Checksum (1 digit).

Line 2: NORAD catalogue number, Inclination, Right Ascension, Eccentricity (decimal point omitted), Argument of perigee, Mean Anomaly, Mean motion (8 decimal places), Rev. number, Checksum (1 digit). ⊕

MEMBERS' LETTERS

Dear Peter,

When I resumed taking weather satellite images after a lapse of many years, I found there was a continuous carrier on 137.62MHz which interfered badly with the NOAA satellites on that frequency. I live close to a reservoir and as there was a small antenna on the water company's building nearby I thought it must come from there. On making enquiries they were most co-operative and temporarily switched their equipment off but the interference continued.

Just when I was contemplating walking around with a Yagi and a portable receiver to try to locate the source we had a close-by lightning strike and the interference ceased! Later, I saw a National Rivers Authority van at the waterworks building so I went to investigate. They had an automatic counting rainguage on the site which had been put out of action by the storm. Once again, I found excellent co-operation and it was soon ascertained that when the equipment was repaired the interference returned.

A letter to NRA Headquarters eventually led to suppressors being fitted and now all is well.

Yours sincerely, John B Tuke, Spring Cottage, Pains Hill, Limpsfield, Surrey, RH8 0RG.

Dear Peter,

Congratulations on RIG Journal No 37, an outstanding production in all respects. Not least, the cover image showing, in great detail, many of the areas I know so very well, including the Zambesi River and Lake Kariba. This is very typical of the Meteor images but, naturally, Meteosat shows the whole African continent. I wish I could get into PDUS but it's too expensive and encryption will probably add to the expense.

Incidentally, the small patch of cloud over the southern tip of South Africa on 27 April brought cool, blustery weather that day as my wife and I and many, many others experienced during our six-hour wait in a queue to cast our votes.

Yours sincerely, George H Jillings, Dalham, Dalham Road, Strawberry Lane, Constanta 7800, South Africa.

Dear Peter,

Greetings from Capetown. Let me introduce myself in a few lines: Joined RIG 2 years ago, been interested in radio since school days, licensed as ZS1BR in 1978, been picking up Meteosat since 1984 with framestore, home-brew converter and 2-metre fibreglass dish. I am now using PROsat II on a 286. Professionally involved in data communications engineering with little time for hobbying.

Your comments in RIG 37 about the fine weather in South Africa were quite amusing. Capetown had incessant drizzle ALL day on 27 April and people queued ALL day to vote. They shared umbrellas, seats, stories and even babies (when they got too heavy). By the way, the new flag has been disparagingly referred to as a multi-coloured beach towel with a Y-front!

Kind regards, Paul Johnson, 73 Joubert Road, Green Point, 8001, South Africa.

[To sin is bad. To sin and get caught is worse. I must confess to editing out quite a lot of unpleasant-looking clouds in the Capetown area on the cover image of RIG 37. I promise not to do it again...without first checking the database to see where members live. Both of the above letters were sent with images from polar-orbiters for which I am very grateful. Two of them appear in this issue. Ed]

Dear Peter,

In reply to the member who wished to get rid of that annoying byline on every printer dump image with Timestep's software mentioned in the Questions and Answers page in RIG37, I offer the following permanent fix.

The line of text is situated in the .DRV printer driver files, almost at the end of each file, and simply has to be edited out, by replacing all the letters of the text with " " (a space). It would not be advisable to simply remove all the relevant bytes as this would alter the length of the file and move the position of other, perhaps vital, information.

The easiest way to edit the file is to use a program such as the file manager XTree Gold, Norton's disk editor, or PC Tools, although any editor that works in Hex will do. Below is the list of Files and the bytes that need replacing with the Hex value 20 (space). Your editor may be able to edit the text directly. You will only need to change the file you currently use with your printer of course.

DM9PIN.DRV - Change bytes 006170 to 0061A9 inclusive to "20"
DM24PIN.DRV - Change bytes 0061C2 to 0061FB inclusive to "20"
HPLASER2.DRV - Change bytes 00645A to 006494 inclusive to "20"

HPLASER3.DRV - (same as HPLASER2.DRV)
HPLASER4.DRV - Change bytes 061BA to 061F3 inclusive to "20"

Most editing programs rename your old version as .OLD or something similar but, if in doubt, make a back-up copy of the file onto a floppy in case you should make an error. For those who would like to see their own byline in place of the original one, simply replace the spaces with your own text. Altering the files in software packages may be a grey area legally but, as it is only for your own use (and sanity!) and not for general distribution, I cannot see anyone objecting.

A. Hacker, Cambridge. [Full name and address was supplied. Ed]

Dear Peter,

RIG Journal 37 has arrived and again provides excellent reading and value for money.

As my existing turnstile performance has deteriorated over the years and I am in the middle of constructing a new one, I found the antenna articles on pages 23, 37, and 41 of particular interest. However, I don't see any gain (or loss) figures relative to a dipole quoted for the stealth patch or the volute antenna. Perhaps for the next issue you could obtain some figures from the authors to replace their "good performance" statements.

The picture of the stealth patch reminds me that many US roofs have a low pitch compared with those in the UK. It also prompts the suggestion that two stealth patches, one either side of a roof apex and connected to Paul Adamson's automatic antenna switch, might prove to be the ultimate answer to those of us wanting horizon to horizon signals without their turnstiles being mistaken for washing lines. One could then tell the enquiring neighbours about solar heating! It might also create a welcome boost in sales of properties with roofs of the correct orientation.

More seriously, I would be most interested to hear from anyone who has used a patch antenna, or anything similar, at 1.695GHz.

Yours sincerely, Chris Wood, 91 Home Park, Hurst Green, Oxted, Surrey, RH8 0JT

Dear Peter,

Recently my work took me to the Gulf of Oman where my company was involved in a pipeline survey. Two vessels were used and I spent most of my time on the "Norris Tide". As these jobs always last longer than expected I took my satellite equipment with me and after a lot of experimentation with antennae (bits of wire,

welding rods etc.) I eventually managed to receive images on a regular basis.

The enclosed images show a cyclone developing on the west coast of India and moving across the Gulf of Oman. We beat a hasty retreat on the morning of 7 June! It certainly made a change from the endless images of cloud-covered UK.

Regards, Geoff Shipton, Chapel cottage, Moor Lane, Sotby, Lincoln, LN3 5LR

[One of Geoff's images appears in this issue. Prior to the satellite era it was believed to be very rare for cyclones to get as far as the coast of Oman but several have been observed there recently. About 15 years ago a major one destroyed the BBC's Eastern Relay Station on Masirah Island and devastated the nearby military airfield. Ed] ⊕

CONVERGENCE OF THE NOAA AND DMSP SATELLITE SYSTEMS

For the past three decades, the United States has operated separate civilian and military polar-orbiting environmental satellite systems. The National Oceanic and Atmospheric Administration (NOAA) is responsible for the civilian programme and the US Department of Defense is responsible for the Defense Meteorological Satellite Program (DMSP).

The National Performance Review called for the converging of the two operational satellite programmes as well as the incorporation of appropriate aspects of NASA's Earth Observation System in order to reduce duplication of effort and generate cost-savings. President Clinton approved the convergence on 5 May.

The converged system's on-orbit architecture will consist of three polar-orbiting spacecraft at 60 degrees plane-spacing to provide an adequate refresh rate throughout the day. Northbound equator-crossing times are planned for 0530, 0930 and 1330 local time. International co-operation has been invited and it is possible that EUMETSAT's METOP 1 spacecraft, due for launch in the year 2000, will take the 0530 position. Full implementation is expected by 2004.

The above has been compiled from "White House Fact Sheet on Convergence of US Polar Orbiting Environmental Satellite Systems" dated 10 May and the testimony of Dr. D. James Baker, Undersecretary for Oceans and Atmosphere, NOAA, before the Committee on Commerce, Science and Transportation, US Senate, on 14 June. ⊕

SHAREWARE CORNER
Les Hamilton

One of the most pleasant aspects of writing Shareware Corner is the continual correspondence with RIG members, with their queries, useful ideas and comments. Thankfully, the last, so far at any rate, have all been favourable. The Shareware Disk Catalogue has been well received, as has the grouping system and the method of archiving programs. Every disk now carries a text file explaining how to get the shareware up and running and members new to computing are strongly advised to read this first. Occasionally, I receive a request for a program not in the Library and, often, I do find something suitable in the depths of a Shareware CD ROM. It was as the result of such a query that GIFEXE appears in this month's listing. Any member with a particular software requirement is welcome to enquire and I'll do my best to dig something out. Now for this quarter's offerings.

BELMONT IMAGE TECHNICIAN

Belmont Image Technician is probably the best and most versatile image processing package for Windows yet to come our way, so much so that it receives a separate article elsewhere in this Journal. For the present, suffice it to say that here at last is an affordable package which can produce colour-composite images by tri-colour merging your NOAA and Meteosat images, as well as allowing a wide range of other functions such as contrast-stretching, histogram effects and filtering. Belmont Imaging have provided this Shareware version (with a 30 days free trial licence) specially for RIG members at a reduced registration fee. Belmont Image Technician, along with the disk manual and some sample GIF images to work with, is available by requesting the Belmont Disk from the Shareware Library.

WST v 4.5

WST is a creation from RIG member Gordon Train and boasts a host of useful tracking features for up to 20 satellites. Equator-crossing times for all satellites can be listed for the day, or for a single satellite for as long as you wish, with overhead passes highlighted; or you can choose to display the flightpaths for one day for a single satellite, superimposed on a map of the Earth. Satellites may be tracked in real-time or in fast mode over a Mercator World Map. There is an option to switch to a local map to give a close-up view of events and there are local maps for most areas of the world. With an extensive help file this is one of the best programs of its type to appear and its author is happy to distribute it among RIG members gratis. Perhaps its best feature of all is the fact that, if PROsat II is installed, but Track II is

not, the installation routine configures the files so that it is called up by the 'TRACK' option from the PROsat II menu screen. [Disk T-02]

BBC_TIME

BBC_TIME is a program to use with a modem to dial up the BBC's Dial-in Time Service which is a useful source of accurate time to set the clock on a PC. It requires a V21-capable (300 baud) Hayes-compatible modem. Also in the package are the utilities 3TIMES.EXE which reads and compares the CMOS, DOS and BIOS clock at 5 second intervals, and BIOSTIME.EXE, which shows the BIOS time every 5 seconds. [Disk U-01]

EARTH CENTRED UNIVERSE

ECU v 1.4 is a Sky Visualization Program for Microsoft Windows. You only need to enter your geographic location and time and the local sky is simulated on the screen in a colourful display. ECU is designed as an observing tool for the amateur astronomer but is equally useful to anyone interested in the night sky. [Disk A-03]

QPEG v 1.3D

QPEG is a fast DOS viewer (for 386 machines upwards) for JPEG, TARGA and GIF images and uses truecolor (16M color), hicolor (32K color), 256 color (either greyscale or dithered color) and 16 color (dithered greyscale) modes. The viewer operates from a simple menu, with features listed on pressing the f1 key. There is a useful image preview feature whereby, as the cursor keys are stepped through the menu of image files, each is shown in a small window. [Disk I-02]

SOLAR SYSTEM

Solar System v 1.0 is a Sun, Moon & planet finder based on Jean Meeus' Astronomical formulae for calculators and claims accuracy capable of placing planets in a 500x telescope eyepiece. It gives right ascension, declination, distance, diameter, alt-azimuth and more. [Disk A-03]

AOS_US v 2.0

This is an extremely effective DOS utility from Reinhard Richter of Hannover which works out Satellite AOS and LOS times, pass durations, maximum elevation and AOS azimuth. Data are read from standard NASA 2-line element files and the program menus allow you to configure for your own location and time zone. Output can be selected between screen and printer or to file. To activate, select the 'Create lists' option from the opening menu, followed by the appropriate 2-line

file. A menu then prompts you to input time and date, but simply stepping through all the options with the <enter> key accepts values from the computer's internal clock. Pages of data are now generated as fast as you can keep pressing <spacebar> and for as long ahead as you wish. [Disk T-02]

JVIEW v 1.00

Jview is a Windows viewer for JPEG images. It offers facilities to grey-scale and, if a suitable video card is present, convert between 8-bit and 24-bit images. There is an option to save files in BMP format and also to transfer images via the Windows clipboard. [Disk I-03]

GIFEXE v 4.1

I have had queries about creating self-displaying files from GIF images. GIFEXE is the answer. At the expense of a small overhead in file size, it creates self-displaying images from your GIF files without the need for a viewing program. [Disk V-01]

UPGRADE NEWS

LVIEW [Disk I-03] is now available in much enhanced version 3.1 featuring toolbar selection of many functions.

Once again, the reviewed shareware is offered till the end of November, as the RIG-38 compilation disk.

SEPTEMBER ADDITIONS TO THE RIG PC SHAREWARE CATALOGUE

Belmont Disk	BELMONT IMAGE TECHNICIAN
Disk A-03	*EARTH CENTRED UNIVERSE V 1.4
	SOLAR SYSTEM V 1.0
Disk I-03	QPEG V 13D
	*JVIEW V 100
Disk T-02	AOSUS v 2.0
	WST v 4.5
Disk U-01	BBC-TIME
Disk V-01	GIFEXE V 4.1

Disk RIG38   All the above (EXCEPT Belmont Image Technician)

Applications requiring Microsoft Windows are indicated by an asterix (*)

HOW TO OBTAIN COPIES OF THE RIG SHAREWARE LIBRARY DISKS

Send up to a maximum of 6 formatted 1.44 Mb MS-DOS 3.5" disks per request to Les Hamilton, 8 Deeside Place, Aberdeen AB1 7PW, Scotland.

Disks must be sent in a sturdy, resealable package such as a padded jiffy bag (or a package within a package) and EACH SEPARATE REQUEST must be accompanied by:-

i)   a self-addressed adhesive label
ii)   stamps for the return postage
iii)   coins (or additional postage stamps) to the value of £2.

Note that overseas members' return postage is free but we would appreciate an exchange of shareware or satellite images in lieu.

Please send any new and updated versions of useful shareware to me at the above address. If you have any problems running any of the shareware from the RIG Library, please enquire by letter and I'll do my best to reply by return. ◉

UNITED KINGDOM TELEPHONE NUMBER CHANGES

This note is primarily for the benefit of our overseas members who make telephone calls to the UK. All area codes are being changed. Under the old system no area codes began with a 1 (not since London's 1 was changed to 71 or 81 a few years ago). All area codes under the new system will begin with a 1 and will, in most cases, be the old code with a 1 incorporated at the beginning. Eg, +44 344 23200 becomes +44 1344 23200. Calls made from within the UK still require the initial zero.

The exceptions are 5 major cities: 532 (Leeds) becomes 113; 533 (Leicester) becomes 116; 602 (Nottingham) becomes 115; 742 (Sheffield) becomes 114 and 272 (Bristol) becomes 117. In these 5 cities the existing 6-digit local numbers will become 7-digit by preceding them with a 2 (for Leeds, Leicester and Sheffield) or a 9 (for Nottingham and Bristol).

From 1 August 1994 until 15 April 1995 BOTH the OLD and NEW codes will work. From 16 April 1995 ONLY the NEW code will work. ◉

ERRATUM

RIG 37 page 47. Boltzmann's constant should read 1.38×10^{-23} (not 1.38 x 10-23). ◉

RIG GIF LIBRARY

Peter Wakelin

I have made up three more disks recently. Disk 131 includes the two images of Southern Africa which are printed in this issue and also Geoff Shipton's excellent image of a cyclone in the Gulf of Oman. Ferrucio Paglia, IW1AM, has sent numerous images and I have included a good HRPT image of the Lower Nile and Sinai on this disk too.

Disk 132 contains just one image - a big one. It is from the Japanese geostationary satellite GMS-4 stationed just north of Papua New Guinea. The full image of Earth was too big for the disk so I have cropped off part of the less well illuminated southern and eastern parts. Some of the simplest viewing programmes like VPIC can't handle such a big file but CSHOW, another shareware programme, is quite adequate if your machine has sufficient RAM. Load up and pan around E. Asia, Indonesia, Australia (it fills the screen!) and the western Pacific. A small part of this image is reproduced here. I am grateful to the Goddard Space Flight Center, NASA for making GMS images (and others) available on the Internet.

At the time of writing, the precise content of Disk 133 has not been finalised. It will contain images relating to the Shoemaker-Levy 9 collision with Jupiter. Currently, it contains 13 images, mostly from the Hubble Space Telescope, but some may be replaced as better images become available. Explanatory text files relating to many of the images are included. I was one of several hundred thousand to access the server at the Space Telescope Science Institute in Baltimore during that hectic week. The system groaned a bit under the strain of it all and the transfer rate slowed to a crawl at times but at no time was I denied access. Thanks a million, STScI.

Disks currently available are those listed in RIG 36 plus the following:

128	British Isles, HRPT (5 images)	Peter Wakelin
129	Africa, PDUS, Meteosat 5 (5)	Peter Wakelin
130	NOAA 13 images (5)	
131	Africa/Mid East, NOAA, Meteor (5)	
132	High res. GMS-4 at 140 deg E (1)	
133	Comet/Jupiter collision (13)	HST/STScI

HERE'S HOW TO OBTAIN YOUR DISKS

The cost is £2 for the first disk plus one pound for each additional disk with no limit to the number ordered. RIG provides disks, packaging and postage. For small orders, UK members may prefer to send postage stamps rather than write cheques for small amounts.

UK members: Cheque or postal order made payable to Remote Imaging Group and sent to Peter Wakelin, 1 Charters Road, ASCOT, Berkshire, SL5 9QF. There is no credit card service for members in the UK.

Other Members: Bank Draft (in Sterling and drawn on a London-based bank) or Eurocheque made payable to Remote Imaging Group and sent to Peter Wakelin at the above address. Overseas members may prefer to pay by credit card in which case orders (which will be subject to a 3% surcharge) should be sent BY MAIL to Mark Clarke, 9 Park Lane, Bulmer Tye, SUDBURY, Suffolk, CO10 7EQ, UK ⬤

WANTED   Dual Beam Oscilloscope. Around 60MHz and modern design. Any reasonable offers around £100 considered. Call Mark Pepper, Camberley 01344 777730 evenings.

RIG AT RALLIES

For those members who are not radio amateurs, a brief explanation of the term "Rally". These are events normally organised by local radio amateur clubs and societies and are held in schools halls or just outside town in marquees in local fields. There is normally parking space provided and a small entrance fee is normally charged.

They consist of trestle tables containing new and used equipment and components, from traders in the electronics and computer field, often at knock- down prices. (Many resemble the familiar car boot sale.)

There are also displays and demonstrations by radio related societies and organisations (such as RIG). They normally start at 10.00 or 10.30am and fizzle out at around 4.00pm. They are normally signposted from the town in question by small signs attached to road signs, etc. reading "Radio Rally", "Rally", or the initials of the society, such as "ERAS", etc.

We hope to attend the following...

September 11	Lincoln, Showground
September 11	BARTG, Sandown Racecourse, Esher, Surrey
September 25	Peterborough, East of England Showground
October 28/29	Leicester, in the Granby Halls (2 days)

We are always pleased to see volunteer members at these rallies, especially those who live locally to the event, who can help out on the RIG stand for a short while and give the regulars a break during the day. ●

FOR SALE   AMIGASAT weather satellite image processing system including Amigasat v2.0 software and manual with interface. Amiga A500 computer (2MB RAM) with PSU, manual mouse and WB1.3. £175 ono. John, Blackpool 0253 594381

RIG HELPLINES

General enquiries John Tellick 081 390 3315
Meteosat information
NOAA information
Supplier complaints

A copy of the Group's rules can also be obtained from John Tellick

Russian and Chinese satellite Peter Wakelin 0344 23200
information

HRPT Peter Wakelin 0344 23200

PDUS James Brown 0656 782632
(not available on Sundays)

Schools/educational co-ordinator John Tellick 081 390 3315

Schools/educational enquiries	John Murray	Torquay	0803 217754
	Frank Bell	Godalming	0483 416897
	Tom Walter	Reading	0734 871330
	Bob Coombes	Haslemere	0428 642930
	John Din	Bristol	0454 773387
	Alan Wright	Norwich	0603 713449

Framestore technical Mike Coombes 0530 243494
support *(7.30pm-9.30pm)*

Microcomputer specialists:

PC and printer problems Mark Pepper 0344 777730
(7.30pm-9.30pm)
BBC microcomputer John Tellick 081 390 3315
Commodore Amiga Chris Pretty 0420 82752
Archimedes Tom Walter 0734 871330

NOTE: We are grateful to the above members for offering their services to the Helpline. Please do not abuse the service by ringing them for queries other than those listed against their names. ⊕

REMOTE IMAGING GROUP
RIG SUBSCRIPTION - NEW MEMBER

If you would like to become a member and receive the Journal, photocopy this page, complete the form below, sign the declaration and send it to...

RIG SUB, PO BOX 142, Rickmansworth, Herts, WD3 4RQ, ENGLAND

The subscription rates for 1994 are...

UK membership	£10.00	Europe outside EC	£12.00
Europe EC	£12.00	Outside Europe	£14.00

Name _____ Call Sign (if any)_____

Address. _____

_____

_____ Post Code_____

Country _____ Telephone No._____

Are you receiving:
Polar-orbiting Weather Satellites _____ Geostationary Weather Satellites _____

Do you require back issues? (see Rig Shop Corner) _____

Amount Enclosed £_____

Are you willing to have your name/address made known to members in your area? YES / NO. *(Delete as applicable)*

DECLARATION: I do NOT object to the Remote Imaging Group holding my Membership details on a computer.

Signed _____ Date _____

THE COLOUR IMAGES

Front Cover:
The fragments of comet Shoemaker-Levy 9 impacted the planet Jupiter between 16 and 22 July. Eight impact sites are shown on this Hubble Space Telescope Planetary Camera Image of Jupiter. The smallest features are less than 200km across. The image is a composite from three different coloured filters.
Credits: Hubble Space Telescope Comet Team, Space Telescope Science Institute (STScI).

Inside Front Cover:
This image shows the impact sites of fragments D and G. The large feature was created by the impact of G and the image was taken 105 minutes after impact. The fragment entered Jupiter's atmosphere at an angle of 45 degrees from the south and the resulting ejecta appears to have been thrown back along that direction. This impact site has concentric rings around it, with a central, dark spot 2,500km in diameter.
Credits: H Hammel (Massachusetts Institute of Technology), NASA and STScI.

Inside Back Cover:
See Peter Hayes' article in this issue.

Back Cover:
This is a composite photo assembled from separate images of Jupiter and the comet as imaged by the Wide Field and Planetary Camera-2 of the Hubble Space Telescope. Jupiter was imaged on 18 May 1994 when at a distance of 670 million kilometres from Earth. Jupiter's rotation between three exposures in different colour light caused the blue and red fringes on either side of the disk. The dark spot showing on the planet's disk is the shadow of the inner moon Io. The comet was imaged on 17 May when its train of 21 icy fragments stretched across 1.1 million kilometres of space. For the purposes of illustration the scales of the planet and comet images are not the same.
Credits: HA Weaver, TE Smith (STScI), JT Trauger, RW Evans (Jet Propulsion Laboratory) and NASA.

IMAGES OPPOSITE

Paul Johnson of Green Point, near Capetown, submitted the top image. It has been processed to enhance ground detail.

The lower image shows a well-developed cyclone in the gulf of Oman. See Geoff Shipton's letter on page 55.

A Cyclone approaching the coast of Oman: NOAA9 visual image at 0500utc on 7th June 1994
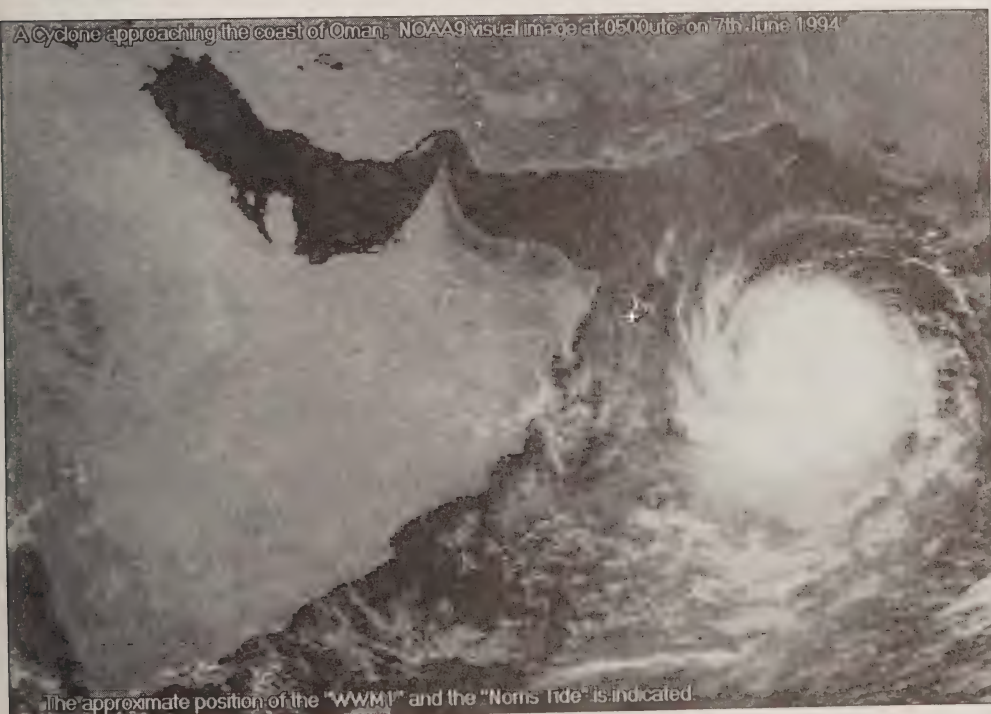
The approximate position of the "WWM I" and the "Norris Tide" is indicated.

RIG SHOP CORNER

ALL PRODUCTS ARE FOR SALE TO RIG MEMBERS ONLY, FOR THEIR OWN PERSONAL USE AND NOT FOR SELLING-ON.

IN THE EVENT OF PROBLEMS WITH EQUIPMENT PURCHASED FROM RIG PLEASE CONTACT RIG IN THE FIRST INSTANCE AND NOT THE MANUFACTURER.

All prices shown include post and packing except where marked

Receiving Equipment	UK/EC Price	Overseas Price
RIG DARTCOM Meteosat Downconverter. Assembled and tested module in tin plate box	£155.00	£132.00
Complete, assembled and mounted in weather-proof box.	£190.00	£162.00
RIG DARTCOM VHF Scanning Receiver. Assembled and tested module with LED channel number display.	£135.00	£115.00
As above but with LCD frequency read-out instead of LED channel number display. *Both the above items are modules and require a box, together with several components, switches, etc.*	£179.00	£152.00
RIG VHF Preamp. Includes a bandpass filter and is ideal for mast-head mounting. Assembled/tested module; needs boxing.	£18.00	£16.00
RIG 1695MHz Low Noise Amplifier kit. *Experienced constructors only.*	£29.00	£25.00

Antenna systems	UK/EC Price	Overseas Price
RIG CROSSED DIPOLES A Turnstile type design, in kit form	£26.00	*(UK Only)*
RIG/TH2 47-element YCV loop Yagi (1.7GHz)	£85.00	*(UK Only)*
DISHES *1.0 Metre (dish only), nearly new condition*	£25.00+P&P	*(UK Only)*
DISH FEEDS	£25.00+P&P	*(UK Only)*
JAYBEAM 5X-Y 2m 5 element crossed Yagi, in kit form	£55.00	*(UK Only)*

RIG Binders

Available by post from Gordon Fleming, 168 Blythway, Welwyn Garden City, Herts. AL8 1DU. UK Price £4.00 each, EC/European Price £4.50, Outside Europe Price £5.00. Cheques to *"REMOTE IMAGING GROUP"* please.

Back Issues of RIG Journals

		Rally Price	UK Price	EC/Europe Price	Outside Europe Price
RIG 8-11	1987	£4.00	£5.00	£6.00	£7.00
RIG 12-15	1988	£4.00	£5.00	£6.00	£7.00
RIG 16-19	1989	£4.00	£5.00	£6.00	£7.00
RIG 20-23	1990	£5.00	£6.00	£7.00	£8.00
RIG 24-27	1991	£5.00	£6.00	£7.00	£8.00
RIG 28-31	1992	£5.00	£6.00	£7.00	£8.00
RIG 32-35	1993	£5.00	£6.00	£7.00	£8.00

Note: Prices quoted are for a set of four, including Post and Packing.

RIG 1-7 are currently out of print. Owing to depletion of some issues, photocopies may be supplied. Individual issues are no longer available (hardship cases excepted).

Ordering Information

All items are available from the Editor, Peter Wakelin and include return by UK 1st class mail (except dishes and Journals). Items to non-UK addresses sent via air-mail.

UK VAT is now applicable on sales to the following EC countries - France, Germany, Belgium, Portugal, Spain, Republic of Ireland, Denmark, Italy, Luxembourg, Netherlands, United Kingdom (including Isle of Man). Members in these countries should use UK/EC price when ordering. EC members who are registered for VAT must forward their VAT registration No. to the Treasurer to enable them to receive VAT exempt goods.

As UK/EC prices now include VAT where applicable; receipts will be issued upon request. Remote Imaging Group VAT Registration No. 594 7483 83. Channel Isles: divide by 1.175 to remove VAT content.

UK members, By Cheque or Postal Order.

Overseas members, Pay by Bank Draft (drawn on a UK London-based bank) or Eurocheque(s). (Payments to a Maximum of £100.00 in any one Eurocheque). No local currency please.

All cheques made payable to *"REMOTE IMAGING GROUP"*.

Credit Cards Accepted (Access/Visa/Mastercard/Eurocard) Add 3% to Total. Available by MAILORDER only from the Treasurer, Mark Clarke, 9 Park Lane, Bulmer Tye, Sudbury, Suffolk, CO10 7EQ.

Please state type of card, Card No., Expiry Date.
All Credit Cards authorised before goods are despatched.
(Note: Ordering by Credit Card does not mean instant despatch!) ⊕

BULLETIN BOARDS

Orbital elements and other information of use to members are available from several electronic bulletin boards. The three listed below all offer free service and are available 24 hours a day. In addition to orbital elements (in both Amsat and NASA 2-line formats), the RIG and Timestep services include regularly updated weather satellite status reports indicating which ones are transmitting and their frequencies. The RIG board also offers a range of shareware programmes.

Telephone numbers:	RIG BBS	0945 85666 (440666 from mid October)
	Timestep BBS	0440 820002
	Dartcom BBS	0822 88249

In each case the protocol is the normal 8 bit, no parity, 1 stop bit. ⊕

PC - WEATHERSPOT

GRAPHICS DISPLAY OF DECODED RADIO MET DATA WITH DISPLAY OF FAX CHARTS AND SATELLITE IMAGES
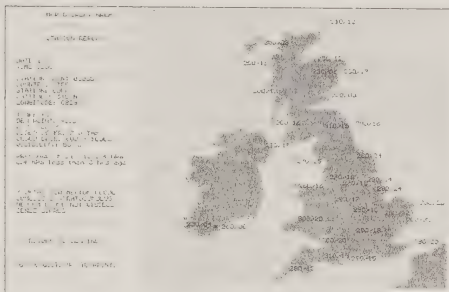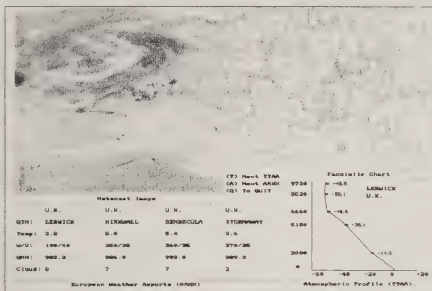
METAXX: Decodes the AAXX Land stations, displays temperature, pressure, wind velocity or cloud cover to one of the country maps for Europe or North America. Displays station decoded data to a table on the same screen. Contains a Meteosat Image of Europe for overlays of reports from N. Africa to the Arctic Circle.

AXGRAPH Plots line graphs of the data decoded by the METAXX module.

TTAA: Decodes the radiosonde reports in tabular form which can be printed or displayed with TTDISP module.

TTDISP: Displays the TTAA data as a graph to above the tropopause, indicates atmospheric stability at each level.

SFLOC: Decodes and displays to a European map the intensity and position of lightning striles with a table of the strike latitude and longitude with the number of strikes per ten minute period.

CLIMATE: Decodes the monthly climatic reports and line graphs all the information, i.e Total rain, number of hours sun.

AC3D: Decodes the Airep reports and displays on a rhombus shaped map a pseudo 3D image of trans-Atlantic traffic with temperature, wind velocity and call sign. Concorde identified in white.

BOUY: Plots the positions of drifting bouys on a North Atlantic chart, with maths processing to determine the drift distance and speed. Historic file enables constant tracking of the bouys showing Ocean currents and sea surface temperatures over days weeks or months.

FILTERS: Filter modules are available to clean up the rubbish in radio collected RTTY metcode reports.

WORKSTATION

A special module to display on a single screen the range of data decoded and displayed with the above and to incorporate users own images. A knowedge of image manipulation is required, i.e. clipping, re-scaling, etcThis module requires SVGA 800 by 600 256 colour display with a VESA driver. Tested on Trident, Oak, Orchid cards.

WINDOW 1: Satellite images Meteosat, NOAA, Landsat etc.

WINDOW 2: Facsimile charts taken either by radio from Bracknel & Offenbach or by telephone from METFAX. A second satellite image. Electrical storm map for Europe with lightning strike overlay. User data, i.e. pollution reports and a map of UK.

WINDOW 3: Sideways scrolling data of land station reports, decoded by the METAXX module.

WINDOW4: Radios sonde graphs decode by the TTAA module.

REQUIREMENTS

MINIMUM 286 PC with VGA colour monitor, SVGA monitor with VESA if Workstation is to be used, some 286's are a little slow but usable. A hard drive with at least 10Mb spare space on the C: drive. A 1.44 Mb 3.5 inch floppy drive. Short wave ssb radio, RTTY demodulator and baudot program. (Demod & software available if required £30.00)

North East Satellite Systems, Cropton, Pickering, North Yorkshire. Tel 0751 417598.

Price £91.65 including VAT post & package. Barclaycard accepted.

RIG Offer from Timestep
PROscan Polar Receiver

What do you want from a Scanning Weather Satellite Receiver ? a) Intelligent squelch that only responds to weather satellites and is quiet when no satellite is present b) To be able to read the frequency directly from the front panel when it stops on a satellite c) To be able to "lock out" unwanted satellites d) Resistant to pager interference up to the pager transmitter itself (where of course the field strength is low e) Resistant to pager interference at 1 to 2 miles where the field strength is at a maximum f) An unconditional 12 month money back guarantee g) Full technical support directly from Timestep.
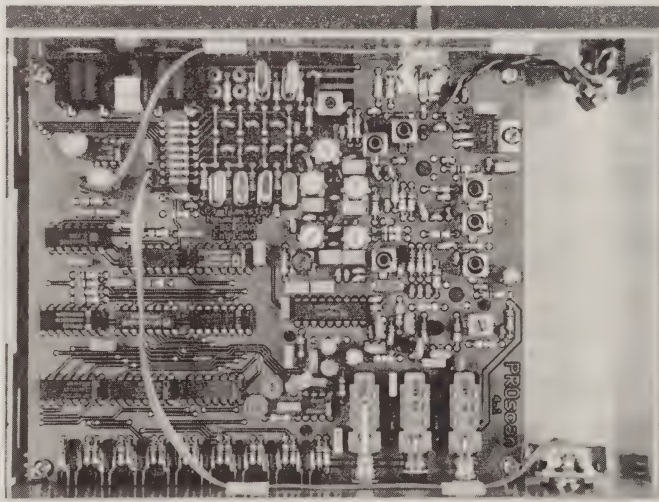
The PROscan receiver uses a lot of filtering, 3 coils in the pre-amp (optional), 4 coils in the RF amp (total 7 coils at RF), 3 coils in the oscillator, 1 matching coil at first IF, 5 ceramic filters at first IF, 5 coils at second IF (total 11 IF filters) and a quadrature discriminator for linearity and high ultimate signal to noise. A preamplifier is not required for short cable runs but adds extra selectivity and makes up for feeder loss on longer runs.

PROscan receiver £185.00 VHF Preamp in diecast box £20.00 UK postage £6.00 plus VAT at 17.5%

Timestep
PO Box 2001   Newmarket   CB8 8XB   England
Tel. 0440 820040   Fax. 0440 820281

RIG Special Offers from
Timestep

** Autumn news from Timestep **

PDUS/HRPT   As Ian Hanson said, "no serious operator is without **both** PDUS **and** HRPT. PDUS to animate and look at the World and HRPT to acquire the highest details". In other words check out <u>carefully</u> the prices, and consider buying one now and the other later, then you won't miss anything !. At our special RIG prices you can afford both now anyway !

Meteosat encryption   If you have the Eumetsat questionnaire, and or if you currently receive Meteosat SDUS or PDUS, or even if you think you might want to receive Meteosat in the next 5 years, write now to Meteosat Encryption Timestep PO Box 2001 Newmarket CB8 8XB. We will provide a £2,000.00 fund to lobby on your behalf. This will not cost you anything, write now, what have you to loose ?

PDUS   Is looking up, the latest news is that a "limited set of data will remain un-encrypted", to celebrate this we have reduced the price of the complete system (only for a while !). Even later news is that encryption could be delayed, possibly indefinitely ! If you look at our price list you will see that we have cut a massive £500.00 off the system, this offer will not last though. Call for a new colour brochure.

HRPT   Is selling really well in the U.S.A. but not here, so to encourage you to use our 10 bit, 5 band, 1.1Km resolution, software, we have reduced the price of the complete system. We have cut a massive £500.00 off the system for a short time only. Call for a new colour brochure.

LANDSAT   Images with stunning 30 metre resolution are available from us now. Anywhere in England and Wales is available in 30 x 30 kilometre data sets. Call for a new colour brochure.

P-HEMT Preamps   We have a few used units that have been refurbished and tested at a noise figure of 0.5dB. These are available on a first come, first served basis for just £99.00 each. This would make your PDUS or HRPT station even cheaper !

Image Processing

Multispectral View II including an image of your choice from England or Wales	£140.00
24 bit video card	£ 70.00
Satview CD ROM 350 GIF weather satellite images	£ 15.00
500Mb of Spot from all over the World CD ROM	£ 99.00

Meteosat PDUS

1.6M dish (inc. patio mount and dish feed)	£330.00
Dish feed (included with the dish above)	£ 40.00
P-HEMT Preamplifier	£200.00
20M cable	£ 15.00
Extra 20M cable and line amplifier	£ 50.00
2 channel PDUS receiver	£400.00
PDUS PC/AT card and full software inc **colour animate**	£150.00

NOAA HRPT

90cm dish, dual feed, all metal work and galvanised ground stand	£250.00
90 degree combiner and cables	£100.00
Yaesu R5400 Az-El rotator	£400.00
25M control cables and heavy duty connectors pre-fitted must be ordered at the same time as the Az-El rotator	£100.00
Tracking card and software for automatic operation	£240.00
P-HEMT Preamplifier	£200.00
20M signal cable	£ 15.00
Extra 20M signal cable and line amplifier	£ 50.00
6 channel (5 fitted) HRPT receiver	£400.00
HRPT PC/AT card and full **10 bit** software	£150.00
Dish feed (dual polarity, for your own dish)	£ 55.00

All prices plus VAT at 17.5% and carriage at £6.00 in Britain. Visa and MasterCard credit cards taken on orders over £25.00.

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